TECHNOLOGY DEPT

Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

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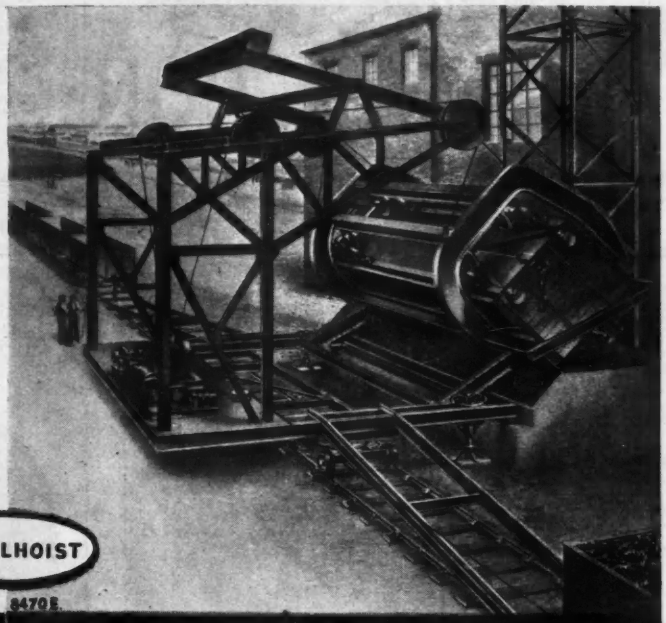

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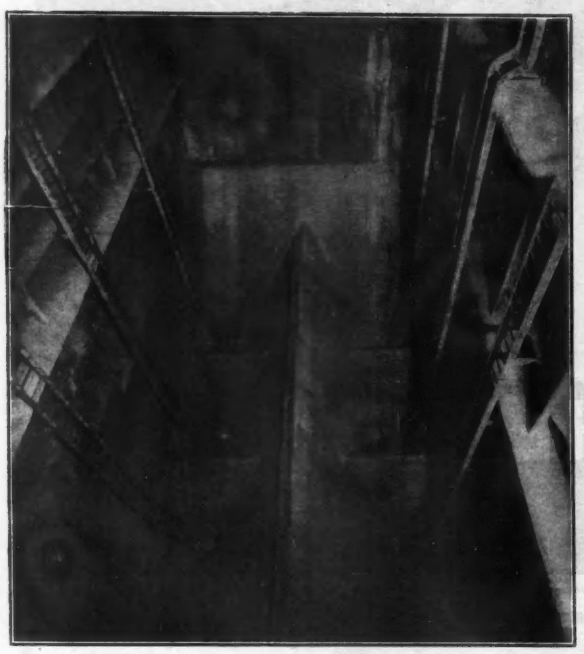

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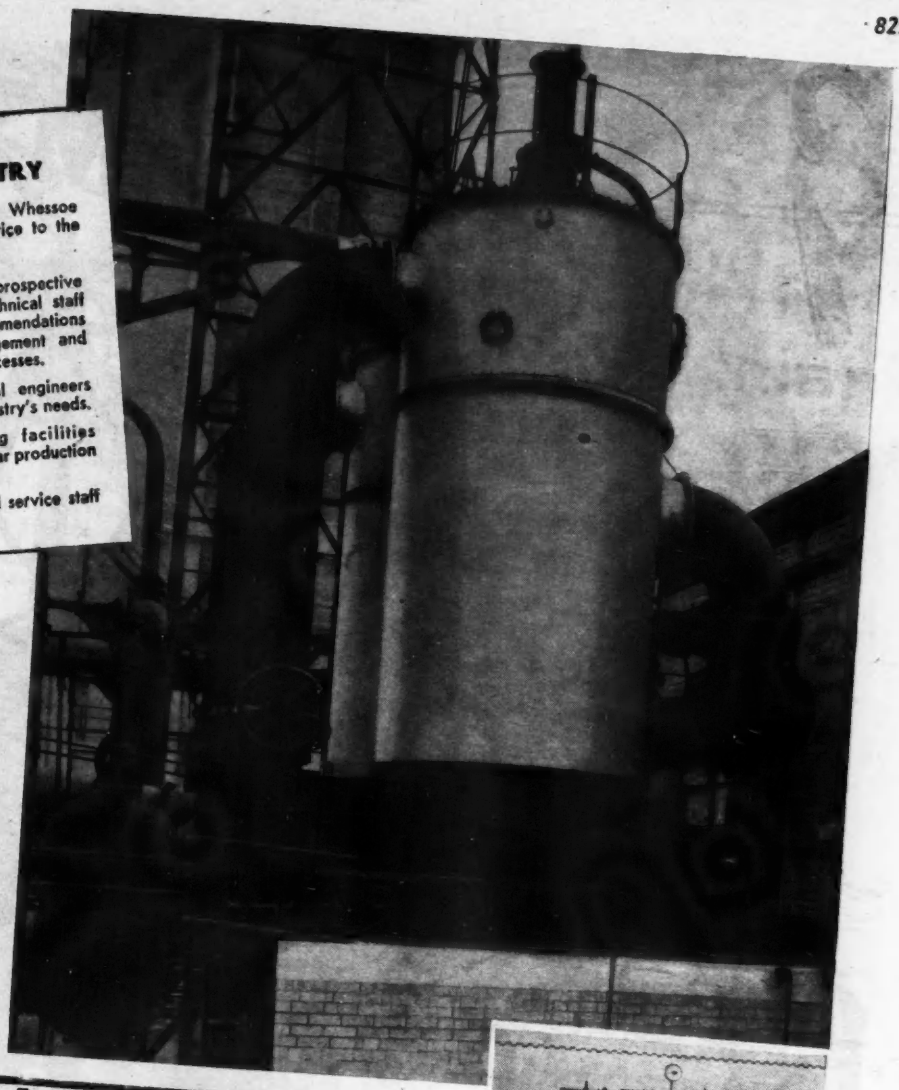

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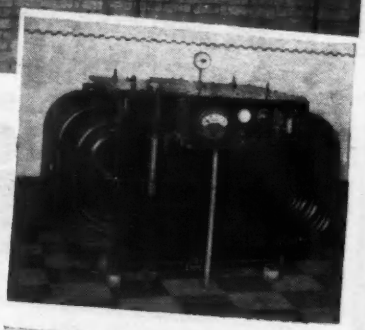

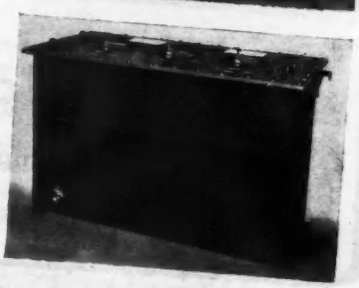

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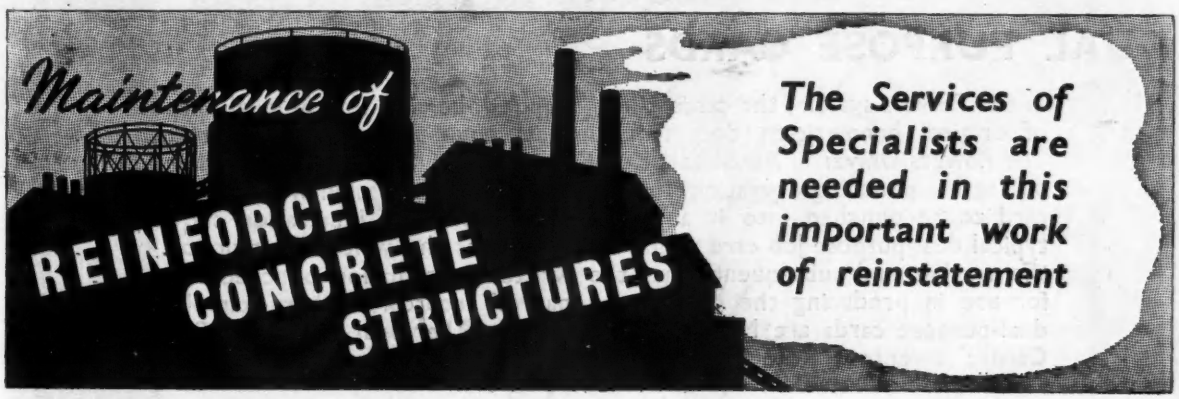
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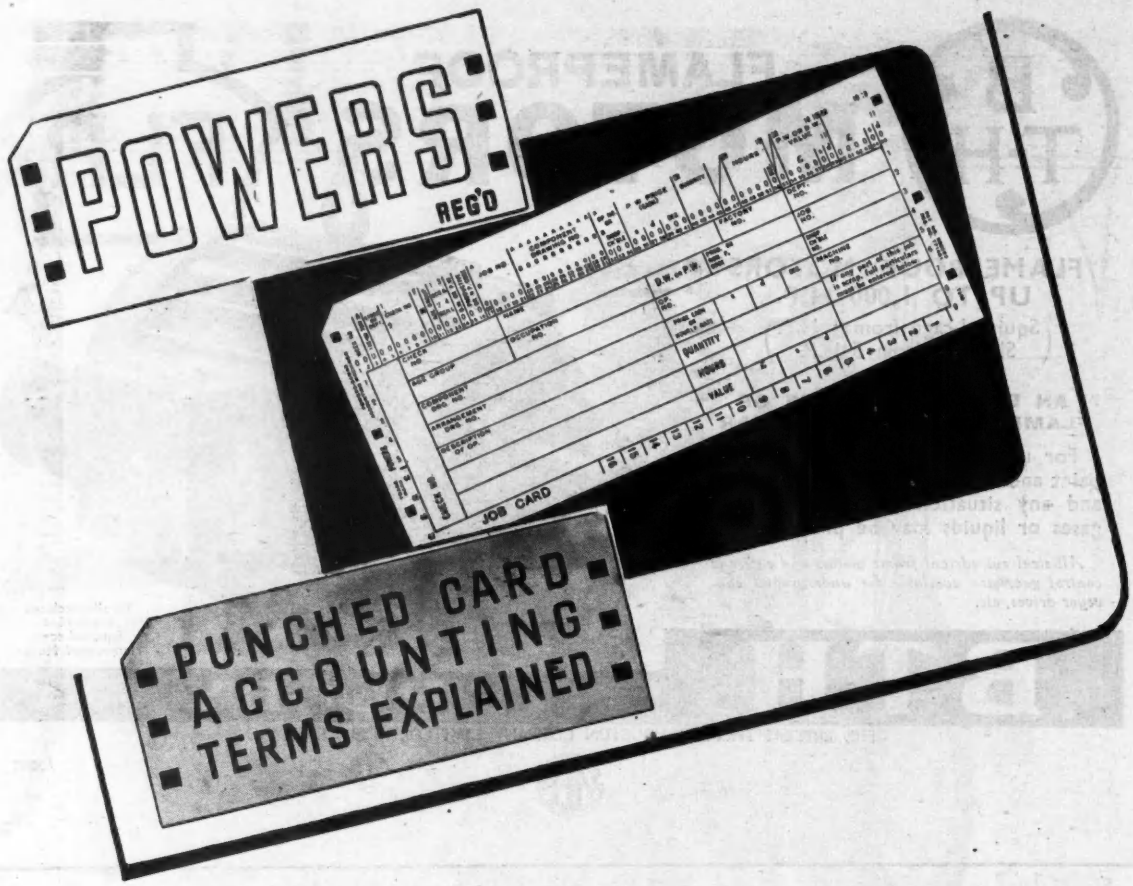

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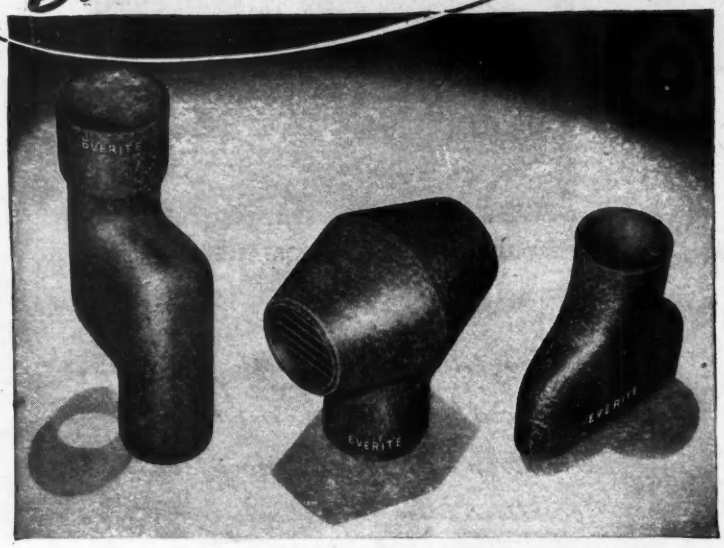

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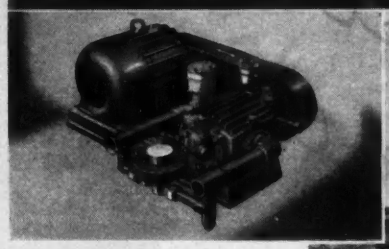

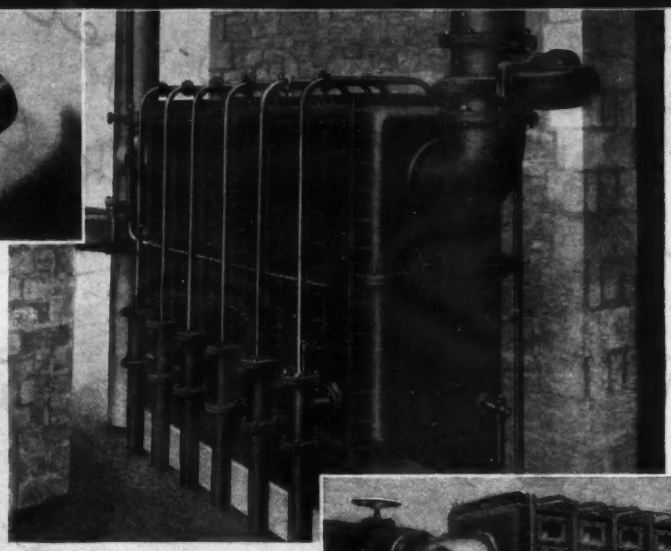

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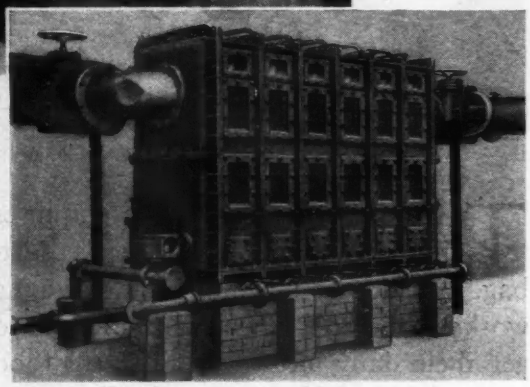

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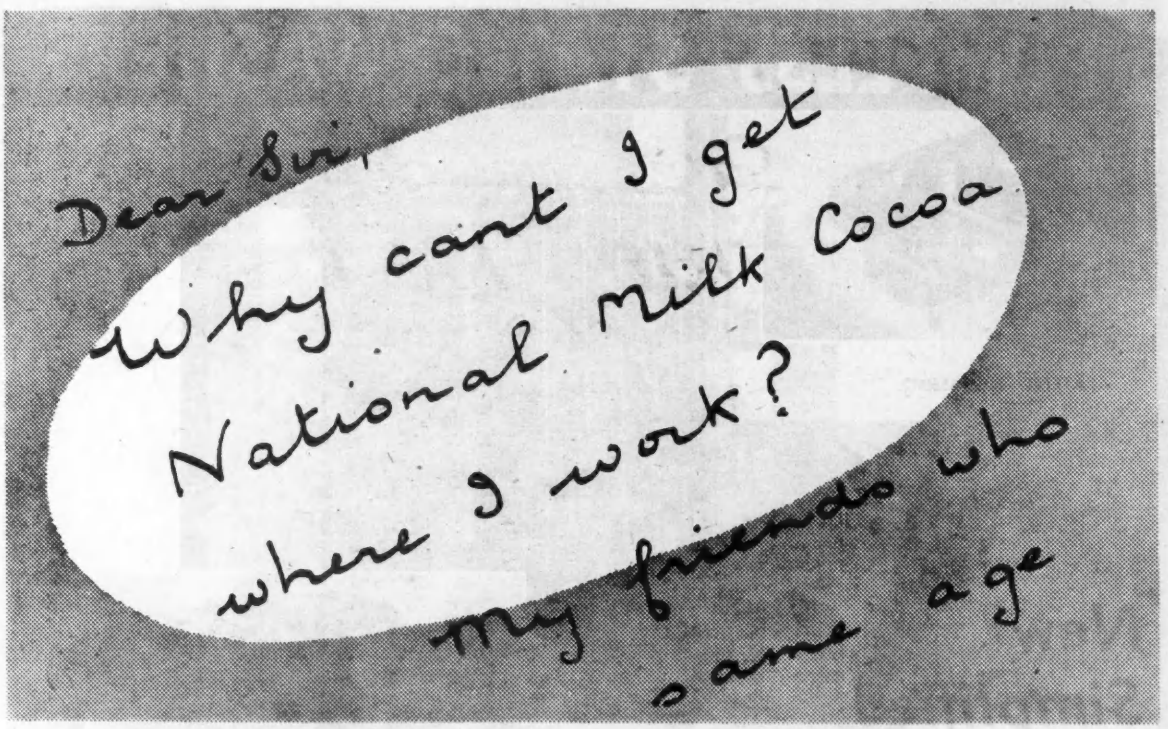

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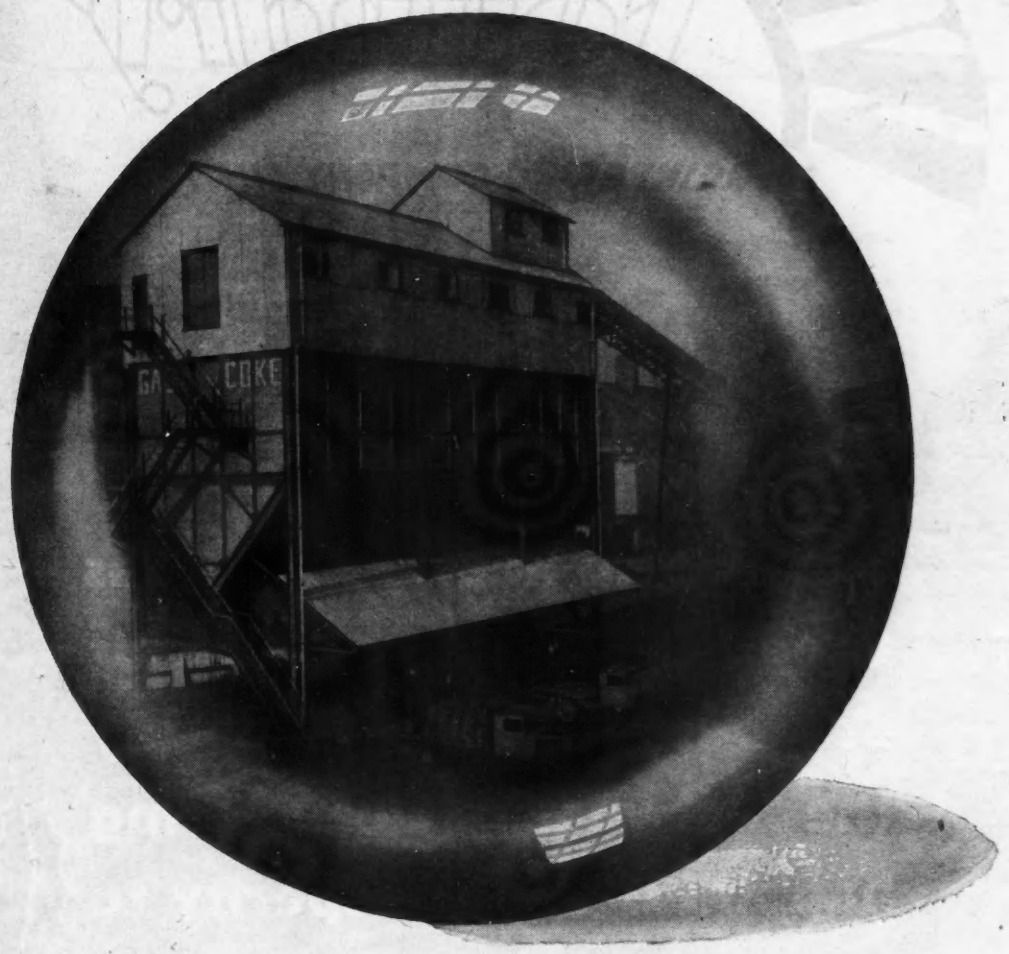

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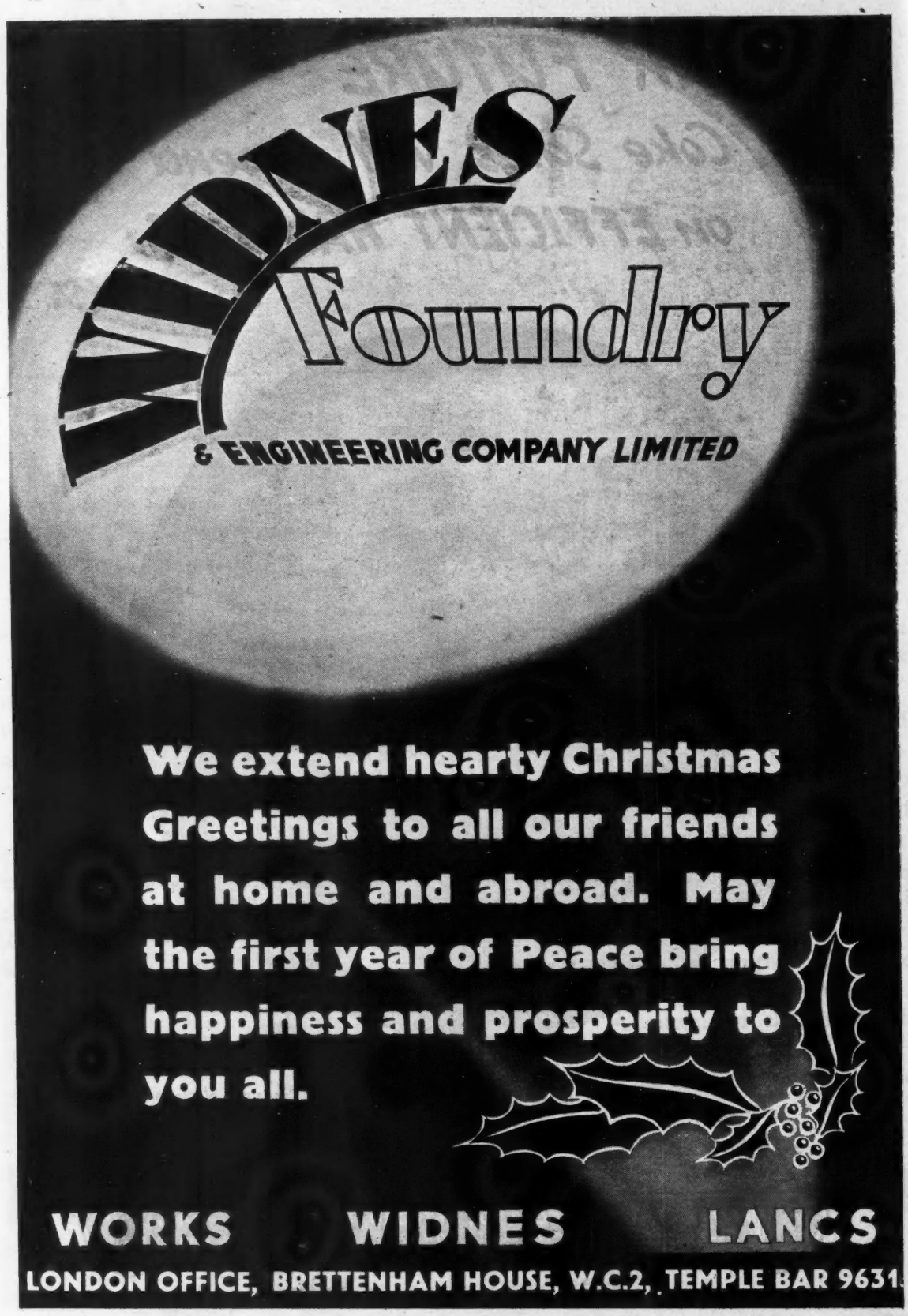
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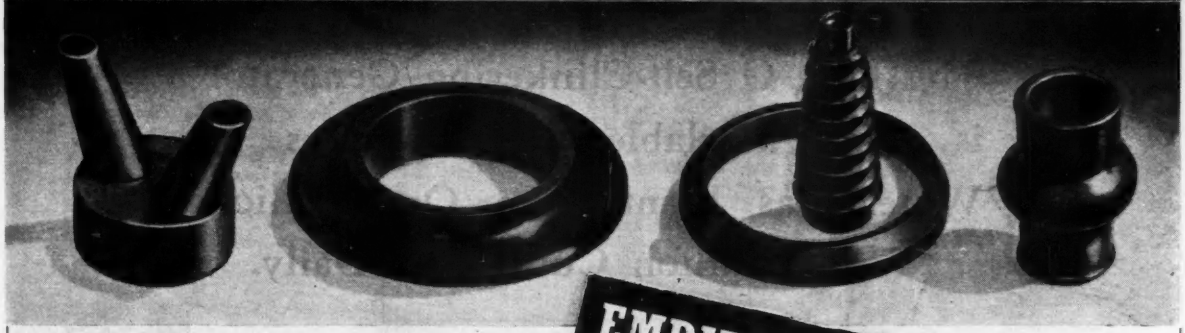

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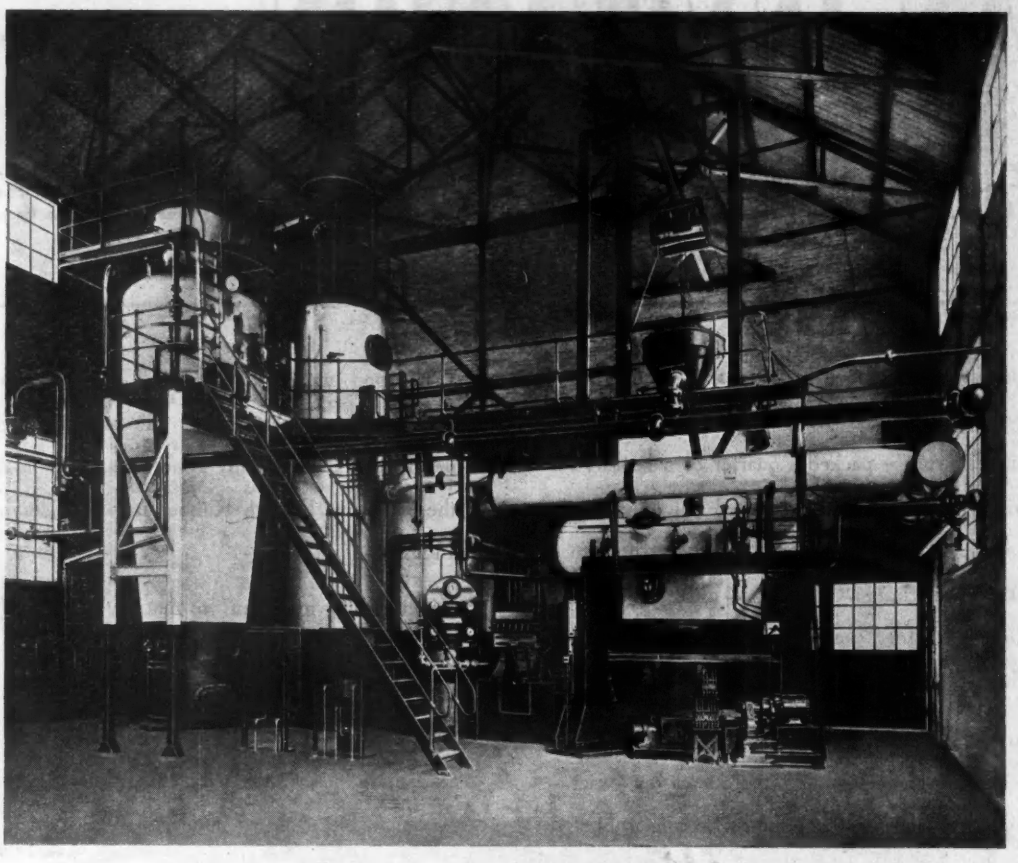

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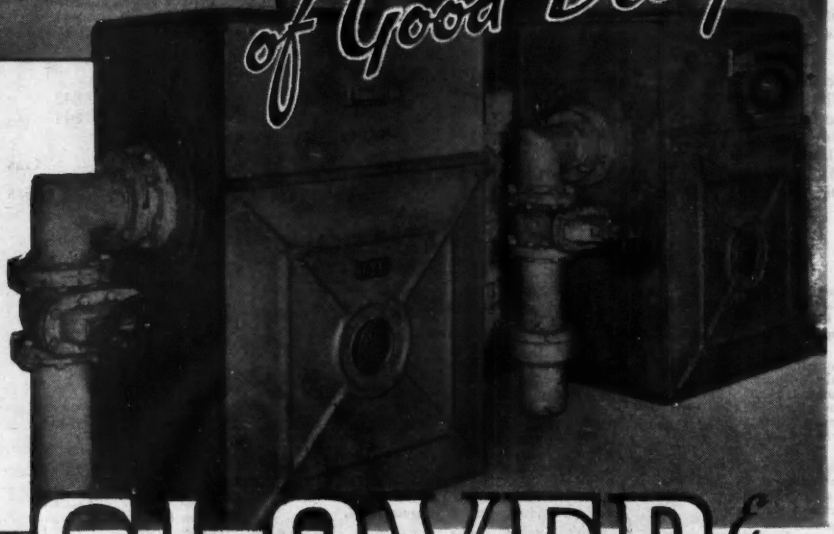

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GAS JOURNAL, DEC. 12, 1945

VOL. 246 97th YEAR No. 4308

EDITORIAL NOTES

GAS INDUSTRY DE NOVO?

AS a thunderbolt on the Gas Industry there descended on Wednesday of last week Command Paper No. 6699, being the report of the committee of enquiry under the chairmanship of Mr. Geoffrey Heyworth into the entire organization of the Industry.

We have no doubt that this command paper will be regarded benevolently by the present Government. It does not follow that all the recommendations—and we think that the recommendations are drastic—will be accepted by the Government, but we think that their implications will be heeded. We have it, in fact, from the Leader of the House in the Censure Debate, that the Government are "fortified by a report by gentlemen who were not Socialist nominees." On later pages of our issue to-day we publish the summary of recommendations of the Committee's voluminous report. We realize full well that these recommendations will have caused many headaches, not only in London, but in places such as Cullen and Comrie, Bude and Bideford, Malton and Market Weighton—and so we could go on. As we write we have before us a map of the proposed areas for regional boards, and the blue pencil delineating the areas has had certainty in its touch. There are to be ten areas, according to the report, and in each area there is to be a board consisting of a chairman and six directors, the chairman and three others to be full-time working directors, their remuneration "to be commensurate with that for like responsibility in industry generally." The Minister of Fuel and Power will choose those whom he thinks fit to fill the offices, which will have an initial period of operation of five years, but he will have the assistance of a Gas Personnel Advisory Board of three people. It is not for us to suggest the names of this trinity of advisers.

England and Wales and Scotland have been entirely surveyed, and company and municipally-owned gas undertakings will, according to the plan, be compulsorily acquired by the State, for which purpose independent but undefined machinery is to be set up to determine fair compensation. The multi-coloured plans accompanying the report appear to exclude from any of this sweeping nationalization plan the Isle of Man, which will presumably be unobstructed in its policy of private enterprise.

The idea of regionalization is by no means new to the Gas Industry. It is a policy which we ourselves have advocated for very many years, and it is a humble and salutary reflection that such a policy has not been implemented before to-day by the Gas Industry itself, working as a united industry—a united industry, "seeking success through bold attack on a wide front, and making its approach in the light of economic and social trends and competitive realities." It seems a sorry state of affairs that an outside and impartial body of men should be empowered to tell the Industry how to look after itself and to demand, for the sake of example, that Manchester should, as a corporation, shake hands with Liverpool, as a company, in the distribution of gas as a public service. As we have said, for long a balanced and defined decentralization of the Gas Industry has been advocated in these columns, and we have no quarrel whatever with the conception of decentralization envisaged in the report of the Heyworth Committee. In regard to municipalities—and the Committee has in its report a good deal to say about municipalities—it is incongruous that the butcher or the candlestick maker should be in administrative control of gas supply. There are of course shining examples of well run municipally-owned gas undertakings, and no doubt there are examples of badly run company undertakings. Broadly speaking, however, a trained gas engineer has in the past almost invariably preferred to be employed by a board of directors holding continuity of office and being intimately concerned with the progress of their undertakings, rather than be bossed by an ever-changing committee elected by the people, presumably for the people, but sometimes for the furtherance of the individual businesses of butchering and candlestick-making. Salary scales alone perhaps provide some reason for what has undoubtedly been a certain choice.

How will the gas engineer stand under any such scheme as suggested in the Heyworth report? It is too obvious that gentlemen of Whitehall would be quite irresponsible in charge of a gas supply which must not fail at any time during the twenty-four hours. It is a corollary that the gas engineer will, as formerly, be required to maintain this public service. It may well be that much dead wood, should the report be implemented, will be cut away from the Industry to the benefit of those engaged in its development. However that may be, the issues arising from the report are serious, and in all conscience the shoulders of the Minister of Fuel and Power will have to be not only broad but exceptionally strong. Surely, too, his offices will need expansion to accommodate the large staff of liaison officers, referees, assessors, statisticians, and what have you, to keep him in the picture as virtual chairman of ten large, progressive, and mutually competitive undertakings. There will be a lot of "devilling" to be done and many questions on the order papers. In each of the ten regions delineated the suggestion is that there should be a chairman whose functions would be general, a production engineer to direct the activities of all production units in his particular area, a chief distribution engineer to direct all storage and distribution activities, and a sales and service director to deal with sales promotion—all of which seems to us good horse sense. In fixing the remuneration of these highly placed individuals, presumably the Minister of Fuel and Power will actually consult industrial administrators to make sure that the income offered will be commensurate with the responsibilities of industry in general. With this somewhat delicate aspect of the report we do not intend to deal at the moment, however.

On broad and general principles the report appeals to us, though modification, if it is put into effect, may well be required. It is strange to think of the Gas Light and Coke Company and, shall we say, the South Metropolitan Gas Company being close and bosom friends, each with its various types of plant, each with its fixed views on lines of development, each having to conform to a general set principle imposing rigorous limits on calorific value, specific gravity, and pressure of gas supply. It is strange to consider the repercussions of the plan on the area supplied, shall we say, by the Nuneaton Gas Company, which for so long has been noteworthy for supplying gas of a calorific value entirely unendorsed by the Heyworth Committee, and doubtless many Scottish gas undertakings will have to alter their views on throughput of coal per retort per day to comply with the Committee's recommendations. Such matters, together with the strong insistence that no gas supply throughout the country shall contain more than 10 grains of sulphur per 100 cu.ft. and that all service pipes should be fitted with governors, or alternatively, that each individual appliance should be governed, must iron themselves out. They cannot be solved in the twinkling of an eye.

And how does the Gas Industry stand *qua* industry? During the past twelve months or so there has been consolidation of the Industry within its ranks. The British Gas Council was to be formally constituted, speaking with one voice for the Industry

as a whole, and co-operating to the fullest extent possible with the Government departments concerned in the running of a national service. As we see it at the moment, the British Gas Council, and the national organizations embodied in it, are poised in the air with fluttering wings, their sole function being to shake hands with themselves, which is hardly conducive to directive force. Yet there must of necessity be some form of Gas Industry voice apart from the notes, beautiful or otherwise, of the Whitehall chiefs. What about national advertising? What about national highway codes? What about the functioning of the Conference of Public Utility Associations? Of course, the Gas Industry will be thinking about these and many other questions.

We are struck with astonishment at the completely autonomous nature of the regions. There appears to be no central co-ordination agency whatever apart from the Minister of Fuel and Power himself. Does this mean that another Government department will be set up for a national industry, when already the machinery exists for precisely that co-ordination which is essential for any national policy covering a public service?

We have spoken of the need for decentralization of the Gas Industry, and we do suggest that whatever the outcome of this all-important report urging a Government, already pledged to nationalize, to nationalize the Gas Industry (which is somewhat akin to taking coals to Newcastle), it provides the golden opportunity for a measure of immediate decentralization in the Industry—the setting up in each of the suggested ten regions of some form of Gas Council which might, *inter alia*, help to co-ordinate development, publicity and consumer service, and, for the public benefit, make smooth the rough road of transition. Here again we cannot envisage smooth working on general policy lines without a clearing house inter-linking but not overshadowing the work of the individual districts.

We have set down a few first thoughts on the Heyworth Committee's report—a report which, if implemented, will at any rate not hinder research within the Industry, but will make unnecessary certain mushroom organizations which have been formed recently in the Gas Industry for the sole purpose of serving sectional interests.

Real Public Service

The recent appeal made by the Minister of Health for the provision of centres of information to assist the public with housing and home problems provided the Women's Gas Council with a unique opportunity for extending its activities in the direction of distributing information regarding home management, and developing a wider understanding and appreciation of the service of gas to women. As briefly reported in another page, the W.G.C., in co-operation with the Housing Centre and with the help of the Ministries and local authorities concerned, has inaugurated the Home Information Centre in London, and, if public response justifies it, others will be opened in the provinces. Subjects covered by the Centre include home-getting appliances, kitchens, planned work, and careers. With the present house shortage the question of selection of type of house is not likely to rise, but useful advice is available on such problems as lease and purchase, rent control, rights of tenants and landlords, and house conversion. In regard to appliances, too, it is not, in present conditions, a question of which cookers, water heaters, refrigerators, &c., to choose, but how to deal with unusual situations and how to get the best out of the appliances available. If there is an invalid in the house constituting a real case of hardship, special heating and other facilities may be available. Many women will have to "make do" with old-fashioned kitchens for some time to come, but the Centre will show how skilful rearrangement of an old-fashioned kitchen can sometimes do wonders. By planning ahead housewives can often avoid unnecessary trouble and waste of time. Judicious planning of housework and shopping can save several hours, and as more domestic equipment becomes available, more time should be saved by giving the housewife a new margin of leisure. With the increasing scope of the modern labour market the training of boys and girls for careers assumes a new importance, and special guidance is given on these subjects, with the co-operation of the Ministries of Labour and Education.

Obviously many girls, demobilized from the Women's Services and recently married or engaged to be married, will be in need of advice on the running of their new homes. Their questions are being dealt with at the Centre by Junior Commander Gough, ex-Staff Officer, Education, A.T.S., who is available for consultation every afternoon. To cover fields of enquiry demanding highly specialized knowledge, arrangements have been made for a number of visiting experts to be available for consultation. Under this scheme such varied aspects of home life are dealt with as the care of children, dietetics and simple home nursing, gardening, dressmaking, and renovations.

Personal

Mr. W. R. OLIVER has resigned his post with the British Gas Council on being appointed Public Relations Officer to the Sheffield and District Gas Company. Prior to the war Mr. Oliver was for some years Display Officer of the British Commercial Gas Association. Seconded in 1940 to take up the post of Senior Publicity Officer, Public Relations Division of the Ministry of Food, Mr. Oliver was largely responsible for the organization and opening up of "Food Advice Centres," and later assisted in the establishment of the Ministry of Food Salvage Division. He was appointed Senior Officer in charge of the London Area. In January, 1943, he was appointed B.B.C. Public Relations Officer, War Correspondent and Topicality Broadcaster in Northern Ireland. Six months later he flew to Cairo *via* West Africa and the Congo to join the Ministry of Information, Middle East Division. He toured the Middle East as "Technical Adviser Visual Propaganda." While in Benghazi Mr. Oliver took a complete inventory of the Benghazi Gas Company on behalf of the Custodian of Enemy Property, and during his sojourn in Tripoli he became a close friend of Dr. Piviosan, General Manager of the Tripoli Gas Company

* * *

Presentations from the staff and the sports club were made to Mr. A. E. RUFFHEAD, who has retired from the post of Engineer and Manager of the Darlington Gas Department, at a farewell supper in the works mess room. Alderman J. D. Hinks, Chairman of the Gas Committee, handed Mr. Ruffhead a wallet of notes, and paid tribute to his excellent service since 1911, and the presentation from the sports club was made by Mr. T. Harrison, General Secretary.

* * *

Alderman H. ROBINSON has been elected Chairman of the Leeds Gas Committee, and the Deputy Chairman is Councillor H. W. SELLERS, O.B.E.

* * *

Mr. L. S. AGENT, Works Chemist and Assistant Engineer of the Maidstone Gas Company, has been appointed Assistant Engineer and Manager of the Gravesend and Milton Gas Light Company. Mr. V. E. CLEGG, of the Bexhill Gas Department, has been appointed Works Chemist at Maidstone.

* * *

Mr. JOE SADLER, Social Secretary of the Wales and Monmouthshire Association of Gas Engineers and Managers, who has represented the Parkinson Stove Co., Ltd., in the South Wales area for many years, has retired from the service of the Company. His son, Mr. Arthur Sadler, has been appointed to succeed him.

Obituary

The death occurred at Lytham St. Anne's on Dec. 3 of Mr. T. H. ARCHDALE, aged 81, who spent the whole of his 64 years' business life with Hardman & Holden, Ltd., and their associated Company, the Manchester Oxide Co., Ltd., of Miles Platting, Manchester. He was one of three brothers, each of whom spent his whole working life with these companies, and his father, Mr. James Archdale, also had a long association with Hardman & Holden, Ltd., during his lifetime.

Letter to the Editor

Gas-Works Liquor as Fertilizer

DEAR SIR,—There are latent powers within the Gas Industry still awaiting development, and one is the utilization of the more-or-less waste product, the crude ammoniacal liquor. My experience may therefore be of interest to all who dig, or have dug for Victory.

Briefly, I divided my plot into two portions, and well sprayed one vacant portion with crude ammoniacal liquor in the autumn. When spring came I planted each portion similarly, planting each variety on the same day, to even out the chances. As each portion of the plot had received over the war years similar tillage, things were as comparable as possible. When crops were gathered the advantages of the crude ammoniacal liquor were obvious, and the harvest was in general 20% better, so much so that I am continuing the use of crude ammoniacal liquor, believing sincerely that its good is cumulative in the soil as the years go by both as an insecticide and as a fertilizer.

Hampton-on-Thames,
Middlesex.
Dec. 4, 1945.

Yours faithfully,
H. J. TOOGOOD.

New Lighting Code

The Illuminating Engineering Society's Lighting Code, which, hitherto, has been concerned chiefly with values of illumination, has been thoroughly revised and considerably expanded, and the new version, issued under the title of "I.E.S. Code of Practice for Good Lighting of Building Interiors," has many features of interest and value. It is divided into two parts dealing, respectively, with natural and artificial lighting. It also includes notes on assessing the amount of illumination required, together with a schedule of pre-determined values for a large number of specific "visual tasks."

The Code is primarily intended for the guidance of those professionally engaged in planning and installing lighting, and their experience and skill will usually be required in applying its recommendations. It will also guide the consumer in formulating his lighting requirements, or he may require compliance with it as a condition of any contract given for lighting. The Code defines good lighting in terms of amenity and utility. Lighting is good if it is suitable, in quality and quantity, both for creating agreeable environmental brightness, and for permitting high efficiency in seeing what it is essential should be seen in any particular case.

Some informative diagrams are included in the Code. These refer to the duration of adequate daylight throughout the year, to the chief characteristics of different systems of lighting, to the permissible brightness of lighting units within specified angles of view, and to the determination of recommended values of illumination according to the nature of the "visual task." Another important feature of the new Code is a section dealing with the quality of lighting and, in particular, with the avoidance of glare.

Clayton's War Effort

Gas engineering firms were not confined to helping the Gas Industry during the war, but were also called upon to provide engines and appliances of war. Messrs. Clayton, Son & Co., Ltd., of Leeds, were no exception, and it may surprise those who know them only as contractors to the Gas Industry, or as boiler makers, to learn of the many ways in which they provided war plant and equipment.

Damage to gasholders and gas plant resulting from enemy action strained the resources of contractors to the utmost, and Clayton's gasholder repair gangs were kept fully occupied. No fewer than 27 major repairs, involving gasholder capacity of nearly 70,000,000 cu.ft., were carried out in addition to many minor repairs attended to by "flying" squads in all parts of the country. At the height of the "blitz" period in May, 1941, repairs were being carried out simultaneously in London and elsewhere to eleven holders of a total capacity of over 30,000,000 cu.ft. In addition a number of new riveted and welded water-sealed and high pressure type holders were built all over the country where additional storage was required owing to increased demand for gas for the munition industries, and many repairs were carried out.

Claytons have for many years been direct contractors to the Admiralty, and many of the firm's war manufactures went to sea. General purpose landing craft (L.C.M. 7) were made complete with engines at the Leeds works, and were despatched ready for immediate launching. Large sections of tank landing craft (L.C.T.'s) were constructed at the works comprising the bows and the portion amidships, leaving the stern to be added at the shipyards. The firm also took part in the scheme for manufacturing fabricated merchant ships inland for assembly at the shipyards, making girders, decks, davit arms, and so forth. Steel barges have always been part of the normal manufacture of the firm, and a wartime extension of this work was the construction of hopper barges for dredging purposes.

When the magnetic mine was first used by the Germans, Clayton's were one of the firms entrusted with the manufacture of booms for use on merchant ships to enable this menace to be overcome. They manufactured buoyancy cans for the "Lily," the device that enables man and his vehicles to traverse the water. A parallel line of manufacture at the Moor End Works was that of screen pontoons and pontoon sections (N.L. equipment) for forming gangways from ship to shore. For the "Mulberry" harbour, Clayton's made welded steel tanks and wheel guards.

Among other marine equipment were girder runways for catapulting aircraft from merchant ships, the first to be installed on any merchant ship coming from their works. They are the proud recipients of a message of congratulation from the former Prime Minister on this feat. Steel masts for merchant ships, anti-torpedo net carriers and torpedo tube and engine bearers for use on high speed M.T.B.'s were also made. Among the most important of regular wartime manufactures were marine mines and buoys. Thousands of these mines were made, and at one time the works delivered at the rate of 175 per week. Regular suppliers in peacetime to Trinity House, Clayton's supplied at the rate of three large buoys per month throughout the war. Ship's boilers were also supplied to the Admiralty and the Merchant Navy, and for use in the Far East in conjunction with distilling units for supply of drinking water for the Forces.

When the war began the firm was engaged in the construction of a vast oil storage depot in the Indian Ocean for the Admiralty, comprising oil storage tanks with total capacity of 225 million gallons. The work at this vital depot was completed during the early war period. Oil storage tanks have been erected for the Admiralty and Air Ministry during the war in various parts of the world. The firm's employees were engaged in the erection of storage tanks at Malta during the siege and intensified "blitz" of the island. Many installations including underground storage tanks were erected in this country also for storing both oil and petrol. An installation of these Clayton-built oil tanks was used to supply the "Pluto" pipeline.

An important extension in petrol storage during war was the storage on or immediately adjacent to the field of battle so that armoured tanks and cars could be readily supplied. A design, in connexion with which Clayton's did some experimental work, was devised for bolted tanks which could be dismantled when not required and put together by unskilled labour anywhere without the need for preparing foundations. Many tanks of this design were made at the Leeds works. Other wartime manufactures comprised parts of Bailey bridges, extensions to Churchill tanks for fitting the carpet device, armour-plating work for Churchill tanks, for Crusader tanks, and for armoured cars. In another sphere receptacles were supplied for the production of penicillin. During the war period increasing use has been made of electric welding, in which the firm have been specialists since its introduction about 40 years ago.

Midland Juniors at Chesterfield

At the invitation of the Chairman, Alderman G. C. Clark, and the Directors of the Bryan Donkin Company, Ltd., a visit was paid to the works at Chesterfield by members of the Midland Junior Gas Association on Nov. 27.

The company had its beginning in the early days of mechanical engineering and has a history that is both interesting and highly creditable. The firm was founded by Bryan Donkin, who was born at Sandhoe in Northumberland in 1768. Bryan Donkin assisted his father, a land agent, until he was twenty. He then travelled south to become agent to the Duke of Dorset at Knowle Park, Sevenoaks. Having a strong bent for engineering he was advised by Smeaton, the builder of the Eddystone Lighthouse, to adopt mechanical engineering as his profession, and was introduced to John Hall, of Dartford, to whom he was articled for three years. In 1803 Bryan Donkin started in business at Bermondsey, London, opening a works which continued for a century, when the business was removed to Chesterfield. The record of the firm's work in the manufacture of equipment for the Gas Industry is notable. Pioneer work has been done in several directions, and its wartime achievements were of a high order.

Following luncheon, Mr. A. Hill (Senior Vice-President) expressed thanks for the hospitality extended to the Association. Mr. S. Brockbank (Junior Vice-President), in seconding the vote of thanks, said they appreciated the welcome given by men whom they knew and respected. They were particularly pleased to see Alderman Clark looking so well in spite of his years.

Alderman Clark, replying, said one was prompted to ask what was going to happen to the Gas Industry in the future. The air was full of talk of nationalization; gas associations themselves had been talking of integration. Such development would mean fewer posts as chiefs of smaller works. Younger men in the Industry must understand that they had a fight before them, and they must quality themselves to take responsible positions. A gas engineer should not be merely a civil engineer, a mechanical engineer, or a chemical engineer, but he should also be a leader of men, an organizer, and one capable of selling and buying. He was proud to be a gas engineer. The Industry was a splendid organization, and no industry was marked by a better feeling of brotherhood. He welcomed the intention to enlarge the scope of carbonization research, but at the same time there was the need for much practical experience in transmission and distribution. Some of the important jobs in the future would be filled by men in charge of distribution. Why the Government wanted to nationalize the Industry he did not know. At present they could not move a hand if they proposed to lay down new plant before official sanction was obtained, but apparently the Government wanted to do something more.

Diary

Dec. 14.—London and Southern District Junior Gas Association: Paper on "Design and Installation of Small Industrial Canteens," D. G. Winslow; Paper on "Bread Baking," A. E. Livett.

Dec. 17.—London and Counties Coke Association: Finance Committee 11 a.m., Executive Committee 11.30 a.m., Central Committee 1.30 p.m., Gas Industry House.

The Ministry of Fuel and Power exhibition, "Other People's Jobs," was opened at the Scottish Building Centre, Glasgow, on Dec. 5 by the Countess of Elgin, attended by Lord Balfour, Regional Commissioner, and Sir Patrick Dollan, Chairman of the Fuel Efficiency Committee. The exhibition includes examples of modern gas kitchen equipment.

Report of the Heyworth Committee

The Committee of Enquiry into the Gas Industry which was appointed by Major Lloyd George, then Minister of Fuel and Power, in June of last year, and was presided over by Mr. Geoffrey Heyworth, has issued its Report (Cmd. 6699). The terms of reference were: "To review the structure and organization of the Gas Industry, to advise what changes have now become necessary in order to develop and cheapen gas supplies to all types of consumers, and to make recommendations."

An introductory note states: "While a number of committees have been appointed in the past to examine various aspects of the Gas Industry, we are the first Committee to consider the Industry as a whole. We therefore thought it necessary to collect a large volume of evidence. We have received written evidence from 82 bodies or persons, and from 43 of these we have taken oral evidence. . . . In addition we have visited undertakings of different types and the works of certain appliance manufacturers."

The Report reviews in detail the structure and state of the Industry to-day, gas quality, gas testing, testing of meters, factors affecting the future of the Industry, the necessity for larger units, and the proposed structure, and summarizes the recommendations of the Committee as follows:

Complete Regional Board Plan

1. Compulsory purchase of all existing undertakings. Independent machinery to be set up to determine fair compensation.

2. Division of the country into ten Regions in general accordance with a map attached to the Report.

3. Regional Boards to be set up to take over all undertakings in their Regions.

4. Each Board to consist of a Chairman and six Directors. The Chairman and three others to be full-time working Directors.

5. Directors to be appointed by the Minister of Fuel and Power for initial periods of five years, subject to renewal for periods of three years.

6. The Minister, in selecting the Directors, to have the assistance of a Gas Personnel Advisory Board of three people.

7. The remuneration of the Boards to be fixed by the Minister, and to be commensurate with remuneration for like responsibility in industry generally.

8. The organization and choice of personnel below the level of the Boards to be the responsibility of the Boards. Selection of personnel taken over with absorbed undertakings for positions in the new structure to be strictly on merit; the Boards to have powers to pay compensation to personnel not retained.

9. Capital to be wholly in fixed-interest form, guaranteed by Government for a commission of ¼ per cent. to be paid by the Boards.

10. All new capital issues to be approved by the Minister of Fuel and Power.

11. Terms of reference defining the objectives of the Boards to be:

(*a*) To promote the maximum development of gas in their Regions in accordance with the best commercial practice. Policy to be directed to serving equitably all areas and interests within the Regions. Usual cost and commercial considerations to govern price differentials.

(*b*) To fix prices to recover *under all normal conditions* all expenses, the full interest on capital outstanding and a commission of ½% per annum to Government.

(*c*) Not to attempt to accumulate reserves (other than depreciation reserves).

(*d*) To recognize that it is the agreed intention of the Boards and Government that the guarantee should be called upon on occasion.

12. The Boards to publish annually accounts, statistics and Report on operations in standard form to be prescribed by legislation. The Minister of Fuel and Power to have power to revise provisions at any time.

Accounts and Report to be published in Press of Region and copies of accounts, statistics and Report to be available to the public on payment of small fee.

Quarterly statistics of make and sales to be available to the Minister of Fuel and Power.

13. Capital asset accounts to be set up by valuation on common basis laid down by the Minister of Fuel and Power as soon as possible after formation of Boards.

14. Provision for depreciation and obsolescence to be charged on basis of schedule of rates laid down by the Minister of Fuel and Power, in accordance with best commercial practice.

Subsequent alteration of rates to require consent of the Minister of Fuel and Power.

15. Central Research Establishment to be maintained by levy on gas sales on basis to be recommended by Boards jointly and approved by the Minister of Fuel and Power.

16. The Boards to take on the obligations in respect of Gas Quality, &c., which are summarized below.

The effect of these provisions is:—

(*a*) To place the responsibility for the efficient operation of the Industry squarely on the shoulders of the Boards. (The absence of any recommendation for advisory panels of experts or of consumers or of a standing co-ordinating Committee of Regional Board Chairmen is to prevent diffusion of this responsibility);

(*b*) To give the Boards freedom to carry out this task. The price of this freedom is willingness to be judged by results;

(*c*) To enable the Industry to compete effectively and without restriction with other fuel industries;

(*d*) To expose the Boards to public opinion; and

(*e*) To place the responsibility for decision as to the success or failure of the Boards on the Minister of Fuel and Power. His position is analogous to that of the shareholding body in a limited company. For this task he has fuller material in the way of accounts and statistics than is normally available to shareholders, and additionally the instrument of comparison with nine separately constituted, but similar, entities.

The plan as outlined has been evolved out of the conditions and circumstances of the Industry as we have found them, and not out of preconceived ideas or general theories. It is essentially one that stands as a whole; its parts are inter-dependent, and additions are as likely to upset its balance as are deletions.

The plan should be put into effect as a whole and not piecemeal, in order to avoid creating uncertainty in the Industry. It should be reviewed at the end of ten years, and the Act which sets up the Regional Boards should provide accordingly.

Recommendations on Gas Quality, Gas Testing and Meter Testing

1. Gas Quality.

(1) Each undertaking to declare a calorific value and specific gravity for its supply, the limits of declared calorific values to be 450–500 B.Th.U. per cu.ft.

Permissible limits of divergency, not to be exceeded for any period of two hours or upwards, to be—

Calorific value . . .	±3%
Specific gravity . . .	±5%

(2) Each undertaking to install governors at individual meters or at individual appliances.

(3) Each undertaking to maintain, in any main or service pipe of not less than two inches in diameter, a pressure not less than two inches in excess of the governed pressure.

(4) The gas supply to conform to the present requirements in regard to freedom from sulphuretted hydrogen, and to contain not more than ten grains of sulphur per 100 cu.ft.

2. Gas Testing and Meter Testing.

Administrative machinery and procedure for the testing of gas and the testing of meters, including the appointment of gas examiners and meter inspe tors, to be completely revised, and the whole responsibility for the work transferred to the Minister of Fuel and Power.

Whether these obligations are dealt with in the Bill which sets up the Regional Boards or in a separate Bill will no doubt be decided on grounds of convenience.

In conclusion, the Committee express appreciation of the help they have received from Mr. Kelf-Cohen, Mr. Evetts, Mr. Chantler and Mr. Prior, of the Ministry of Fuel and Power, and from Mr. James, the Secretary of the Committee. Their assistance in collecting information, in preparing memoranda, maps and charts and in the drafting of the Report has been invaluable.

The Committee of Enquiry consisted of Mr. Geoffrey Heyworth (Chairman of Lever Brothers and Unilever, Ltd.), Mr. Stuart R. Cooper (of Cooper Brothers and Company, Accountants), Sir Jonathan R. Davidson (formerly Chief Engineer to the Liverpool Corporation Water Works, and subsequently to the Metropolitan Water Board), Mr. Gavin Martin (General Secretary of the Confederation of Shipbuilding and Engineering Unions), and Professor D. M. Newitt (Assistant Professor of Chemical Technology at the Imperial College of Science and Technology).

A Change of Address is notified by the Gas and Electricity Division of the Ministry of Fuel and Power, which has moved from New Oxford House, Bloomsbury Way, W.C. 1, to Cromwell House, Dean Stanley Street, Millbank, London, S.W. 1. From Dec. 10 the telegraphic address will be "Minfupo, Souwest, London," telephone number Abbey 7000, and the address for communications 7, Millbank, London, S.W. 1.

Fuel Utilization was the subject of an address by Dr. G. E. Foxwell to the Scottish Section of the Institute of Fuel and the Scottish Branch of the National Smoke Abatement Society in Glasgow on Nov. 30. In the course of his address he stated that from a technical point of view Government ownership of the carbonizing industries was not to be advocated. The organization of the C.E.B. might well serve as a model for a similar authority for the whole of the carbonizing industries.

Retort House Technical Control*

One of the best living writers has said that good writing is characterized by "lucidity, simplicity, euphony." Mr. A. R. Myhill's little book stands up to this test very well indeed. Its lucidity is beyond question. Its simplicity—if this means an entire absence of rhetorical ornament or padding in any shape or form—is refreshing. Its euphony will, no doubt, only be appreciated by his fellow carbonizers. For Mr. Myhill knows carbonization, at any rate in the continuous vertical retort, with a knowledge deep-seated in his very blood. His treatment of the subject is unique, resulting from first-hand experience. He has assimilated other people's work, but he has not taken scissors and paste and stuck it into his own book, while not failing, however, to give the necessary references.

He does not boggle at a little repetition to enforce an important point. For instance, he has a very clear picture of the continuous vertical and what goes on in and around it. He sees it as a tall vessel built of porous materials, with water gas coming up from below and with the coal gas crowding out at the top. He sees the necessity to release and regulate the outflow of this gas so that at all points in the length of the retort the pressure conditions outside and inside shall be at the balance. And this view he presents again and again. "The need for this careful control" (*i.e.*, of pressures and pulls) "is due primarily to the porosity of the . . . material of which the retorts are constructed." "Inward leakage of furnace products through the retort wall is more serious as a rule than outward leakage of coal gas into the flues . . . The pressure in the retort should always, therefore, be positive." "*Under no circumstances should pull conditions be allowed to prevail on the top of the retorts* [the reviewer's italics]. It is not uncommon to find this, but it is bad practice nevertheless." And finally, nearly the whole Section 6 on pp. 60 and 61, culminating in the sentence: "During normal working conditions there should be definite pressure conditions within any vertical retort at the position of the gas offtake." He describes an ingenious method to arrive at the pressure conditions, as recorded in the foulmain at inlet retort-house governor, which corresponds to a real pressure within the top of the retort.

This little book of 120 pages is confined closely to its subject. Only 12 pages are given to an account of the systems of carbonization at present working. Just two remarks may be permitted here. Main coal bunkers practically always hold 48 hours' supply and sometimes more. Semi-continuous (? enclosed intermittent) systems are working at Cambridge, St. Albans, Sydenham; Mr. Hunter Rioch referred to the first a few months ago, and the second was described in considerable detail by Mr. Battersby in 1942 (see "GAS JOURNAL," Vol. 240, pp. 218 and 280).

The second and third chapters are devoted to a discussion of the relation of the type of retort to the coal to be carbonized. The subject is returned to later under the heading "The Influence of the Type of Coal Carbonized." Here Mr. Myhill might have permitted himself a reference to the recommendations made to the Coal Conference at Manchester last February under the auspices of the Institution of Fuel (see "GAS JOURNAL," March 7, 1945, p. 307). It may be doubted whether the choice of a carbonizing system cannot be summed up in the question, which system will produce the cheapest therm under the given conditions? Mr. Myhill is not really in any doubt about that.

But the big chapter is that on the Maintenance and Influence of Operating Conditions. As far as the reviewer is aware this is the first attempt on the part of a real operator, combining practical experience with a sound scientific and technical background, that has ever succeeded in a comprehensive treatment of this subject. There is nothing like it extant. True, it is coloured by the obvious fact that the author is mainly interested in one system of continuous verticals, but that is proof of its authenticity, and nearly every part of it is applicable to every other continuous system, and much of it to the intermittents. The mere reading of it was a pleasure. One continually comes across a remark showing Mr. Myhill's grasp of essentials. "The total quantity of heat produced by any furnace which is used for heating a retort setting is dependent on the quantity of fuel consumed and on nothing else." The treatment of the producer is very well done indeed. But one wonders after all whether the early workers on the pressure producer were not right in arranging for injecting air and steam independently, separately controlled, into the fuel bed.

It is good to note that Mr. Myhill is nearly as insistent on pressure conditions in the setting, or the top portion of it at any rate, as in the retort, and that he recommends full collaboration between the builders of the settings and the operators. Table I, one of his rare quotations (from Richards on *Perspective in Carbonizing Costs*), needs the basis prices to make it intelligible.

Perhaps Mr. Myhill was justified in writing no more than seven pages on the big subject of Refractory Materials. Perhaps he might have made a little more of the critical temperatures of silicas and the need to avoid alternations of temperature in these regions.

The final chapter ("Systematic . . . Control") follows directly on the very fine chapter on Operating Conditions above referred to and is equally masterly. That weights of coal elevated to coal bunkers and those of coke to producers "should be booked daily" is a counsel of perfection. It is time that all important installations were designed so that this should be readily possible. The interpretation of the results of the analyses of the several gases, producer, retort and flue gases, is admirably treated both in this chapter and elsewhere. The Section on the yield of gas per ton might have been rendered easier of digestion by the use of the "Steaming Curves." And there might have been at least a reference to the Test Code for Continuous Vertical Retorts, B.S. 1034 : 1942.

Very soon it is to be hoped that in every continuous vertical retort operator's pocket will be found a dog-eared copy of this excellent little book.—T.A.T.

* *Retort House Technical Control*, by A. R. Myhill. Published by Walter King, Ltd., "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C.4. 12s. 6d. post free.

Possibilities of Atomic Energy

The *Times* reports that on Dec. 6 Sir John Anderson, Chairman of the Advisory Committee on Atomic Energy, addressed the members of the Manchester Research Council on science in relation to reconstruction.

The many triumphs of science during the war, Sir John Anderson said, showed the high technical efficiency of our industries, and their readiness to appreciate and develop new ideas born in research laboratories. Turning to the future he examined what was needed in order to make the most of our resources, actual and potential, and of our opportunities.

Referring to the investigations into the use of atomic energy and the prospects of industrial use, Sir John Anderson said it was quite certain that nothing had been discovered to justify the expectation that the energy released by an atomic explosion could be used directly as a source of industrial power, as, for example, the explosion of gases was used in an internal combustion engine or a gas turbine or in certain forms of rocket. The only method which existing knowledge suggested as practicable depended upon the conversion into heat of the energy released by a controlled process of nuclear fission. There were no difficulties in principle there, but very serious difficulties arose in practice.

It would be absurd to suppose that these and other difficulties would not be overcome in time, and there was always the possibility of some fundamental new discovery completely changing the character of the problem, but the best opinion he could offer—and it was not based on his own conclusion, but on the conclusions of those on whose judgment he could most confidently rely—was that it would be many years before nuclear energy came on the market for any but the most limited and specialized purposes in competition with existing sources of power. Nevertheless, the ultimate possibilities were such that it was clearly incumbent upon us as a nation to devote all the resources we could spare to further researches in this field.

These recent discoveries opened up an enormous new field of scientific work, and should give tremendous impetus to research by physicists, chemists, and engineers. Indeed, the matter went much farther, for the devices that were employed to produce the new element plutonium provided a ready means of procuring a vast range of new radio-active substances, including radio-active forms of common elements used in medicine. For example, radio-phosphorus, radio-iron, radio-sodium, and many other things could now be administered with the normal substance in proportions too small to be harmful, and their radio-active properties could be used to determine the exact behaviour of the particular therapeutic or nutrient agent in the human or animal organism.

Home Information Centre

The end of the war has certainly not ended the housewife's problems, and little has been done to alleviate the many difficulties of starting and running a home. In an effort to meet these urgent problems, the Women's Gas Council, in co-operation with the Housing Centre, have organized a Home Information Centre at 169, Regent Street, W. 1.

The Rt. Hon. Ellen Wilkinson, M.P., Minister of Education, who opened the centre on Dec. 4, stressed the difficulties which beset the ex-Service housewife, for whom the centre makes special provision. Advice upon this and such kindred subjects as accommodation shortage, acquisition, renovation, modernization of appliances, and careers is obtainable. Specialized subjects will be dealt with by visiting experts.

The premises occupy a prominent corner position and are attractively decorated. Ascot, Main, Ewart, Potterton, and other makes of appliances are on show, each furnished with a wall diagram to show its uses and methods of operation. Books and pamphlets on housing and heating are available.

The centre receives assistance from the Ministries of Health, Labour, Education, Food, and Fuel and Power, and from the L.C.C. and Westminster City Council.

It is an entirely new project, and, if successful, will be followed by similar centres in the provinces.

Fuel Services in Post-War Homes

British Gas Council (Midland Management Committee) Discussion

A Conference on "Fuel Services in Post-War Homes" was held at the Botanical Gardens, Birmingham, on Nov. 21. The gathering was convened by the Midland Management Committee of the British Gas Council and was presided over by the Lord Mayor of Birmingham, Alderman A. S. Giles, a former Chairman of the Corporation Gas Committee. There was a large attendance of representatives of the Gas Industry and others from all parts of the Midlands.

A letter was received from Mr. William Foster, Parliamentary Secretary to the Ministry of Fuel and Power, who was unavoidably absent.

Mr. F. C. BRIGGS, referring to nationalization, said the Gas Industry had for fifty years and more had a very strong sense of public service. The Birmingham Gas Department was a shining example of the way in which a gas undertaking should be run. There were others running equally efficiently and some which were not quite so good, but it seemed to him that it did not matter "tuppence" who owned the undertakings. It was the spirit that actuated and guided the management in the public interest that really mattered. "Personally," said Mr. Briggs, "I cannot see that any change of ownership is going to make the slightest difference to the good; certainly I cannot see that the public will benefit by it, but I will say this, if it is the Government's intention to nationalize the Gas Industry, it can be assured of the full co-operation of all the national organizations in the Gas Industry to make such arrangements as are made to operate, as maybe, in the public service."

They were happy to have so many architects with them, and thus looked upon them as their allies. They knew that to the best of their judgment they exercised an unbiased opinion, whether it be in the service of housing authorities or individual builders. They wished to co-operate with them, and they felt the earlier in any scheme they could enter the discussions the better would be the result. There were present Chairmen and Presidents of County Architectural Associations, and in the forefront he put Mr. C. F. Martin, President of the Birmingham and Five Counties Architectural Association.

Mr. MARTIN, in response, said that the use and proper and economical application of gas in the home was a matter of primary importance at the present time. "Those of us in a position to know," he said, "are alive to the extremely efficient organization of the Gas Industry—a conspicuous example of the beneficial results of competition. We are, therefore, grateful for the opportunity afforded by a conference, such as we are attending to-day, to ventilate our ideas and improve our knowledge."

The Lord Mayor welcomed Mr. G. C. HOLLIDAY, who in the course of his Address said that they already had a Ministry of Fuel, nationalization of the fuel industries was not far off, and sooner or later there would probably be some degree of co-ordination and planned development in fuel resources. Houses should be designed to give reasonable freedom of choice of heat service, so that full advantage could be taken of future developments in the more efficient utilization of all fuels. He went on to draw attention to the magnitude of the Gas Industry, which had a vital part to play in giving better heat service in the home. Gas had a high degree of flexibility and control, and was capable of giving extremely speedy service owing to the high heat inputs that could be made available in a relatively small appliance —*e.g.*, some domestic gas water heaters had a heat input equivalent to 20 kW. per hour. Precise control of gas for cooking was given by tap and thermostat, and there were instantly available heat inputs of 50,000 to 100,000 B.Th.U. per hour, which in terms of electricity was equal to 14 to 30 kW. The present type of gas cooker could provide complete cooking for a family of four for about 80 therms per annum. From the point of view of national fuel conservation 80 therms of gas used up only about half a ton of coal. Mr. Holliday concluded by saying that new standards of heat service were practicable, and by using gas and coke they could be obtained at low cost and with a minimum consumption of the nation's coal. No other fuel could give that service with such economy of national coal resources, even ignoring our valuable bye-products. In less than two decades before the war gas appliances had been improved to such an extent that four therms could do the work previously done by five.

The Lord Mayor thanked Mr. Holliday for his Address.

Dr. E. W. SMITH (President of the Institute of Fuel) opened a discussion on Mr. Holliday's Address. He would like to congratulate the Committee on having been one of the first to bring together a meeting of that kind to discuss this subject, and further he congratulated them on having such an able exposition of the subject as had been given by Mr. Holliday.

Nothing he had said could be put down to special pleading for the Gas Industry because he (the speaker) was a member of the Egerton Committee and of the Ministry of Works Committee, and he knew that Mr. Holliday had taken as his data figures that had been agreed by all industries for domestic heating requirements. Architects could take the figures with safety because wherever it had been necessary to make a reservation he had made it. He felt that architects should so design their houses that the terminal of any chimneys for open fires should be standardized in such a way that, when the householder became less barbarous, a change-over from the open fire could be made without structural alterations. There had been a lot of talk about nationalization. He thought the fears entailed in that suggestion were groundless. He could see that enormous advantages were possible in a form of nationalization of the coal and gas industries. He did not think that anyone need worry that the running of the industry would be in any other hands than those of the administrators and technicians as they had them to-day, modified, of course, by better organization and the better placing of men. Speaking of the future, Dr. Smith said his experience within the Ministry and since was that the Gas Industry never stood higher than it did to-day, as a national necessity; it was taken for granted for many years, but to-day, whether for domestic or industrial purposes, gas was only at the beginning of great future possibilities.

Mr. D. E. E. GIBSON, Coventry City Architect, emphasized that the question of heating was bound up to a great extent with the planning of houses.

Mrs. DAVIES, Chairman of the Shrewsbury Housing Committee, did not want houses they built "all-gas"; she still wanted to see something of the attenuated relics of the open fire, but she would like to see smokeless fuel used. She thought there was a great future there if the housewife was educated up to its use.

Mr. J. S. FYFE (Leicester) said the problem local authorities were up against was that of cost. They did not object to putting in gas, but they objected to the cost. Domestic smoke was responsible for the major part of the smoke nuisance, and it was to be hoped that all local authorities would encourage the use of smoke-prevention appliances in all houses.

Mr. G. MATTHEWS (Chairman of the Regional Industrial Council for the Gas Industry) said when he heard people almost apologizing for the Gas Industry a primitive instinct to defend the Industry rose to the top. He was there to defend the cause of gas in all its forms in the homes of the working people of this country. He referred to the importance of coal to the nation, and said no industry in the country was responsible for the conservation of coal more than the gas industry.

Mr. HOLLIDAY, in reply, agreed with the desire for better insulation. Mrs. Davies was very attached to the open coal fire. The open coke fire was twice as efficient as the pre-war version, and they had sold more or less by recommendation from one person to another.

The proceedings concluded with a cordial vote of thanks to the Lord Mayor by Mr. BRIGGS.

Industrial Applications of the Non-Aerated Gas Flame

The following discussion took place on the Paper by Mr. J. F. Waight to the London and Southern District Junior Gas Association on Nov. 2. The Paper was published in the "JOURNAL" of Nov. 28 (p. 765).

Mr. **Dean Chandler** said that they would have gleaned from the Paper that the Author was an ardent advocate of the neat gas principle of combustion, which was a method of burning gas in which all the air required for its combustion was supplied entirely at the point of combustion. Advocacy of this method was not surprising; closer attention should be given to this very simple procedure in gas combustion technique where its application was convenient, expedient, and appropriate. He did not suggest that neat gas combustion was appropriate in all cases. That would be foolish indeed, and no experienced technician would make such a suggestion, for it was clear that there were many heat treatment processes in which the pre-mixed air gas flame was essential.

It had, however, been something of a mystery to him that gas combustion technologists had not given more attention to the merits and advantages of the simpler method of burning gas in furnaces and other heating appliances. Simplicity in burner design and application could be efficient and effective. Simplicity—other things being equal—was always right, and the best policy to follow. Elaborate and complicated systems in the nature of such things were always more liable to break-down and failure.

When they reviewed gas combustion problems they found that nearly all of them involved little more than the provision of means by which the potential heat in the gas could be efficiently and effectively transmitted to the solids, liquids, or gases to be heated. If transmission could be satisfactorily effected by burning the gas in a straightforward manner just as it flowed from simply formed orifices, and without the use of complicated machinery or air gas mixing devices, then surely it was common sense to adopt that method. Mr. Waight had indicated in his Paper, by a variety of examples, something of the extent of the field in which this method of heating was suitable and appropriate. There seemed to be an idea abroad that the neat combustion principle was completely bound up with the use of Bray type jets; that was very far from being the case. In many instances the neat gas burner consisted of nothing more than correctly-sized holes drilled in an ordinary piece of metal tube—gas barrel was often used, and excellent burners had been made with nothing more elaborate or expensive than that. Sometimes refractory

nozzles were inserted in suitable metal fittings, but in all cases care and thought were called for in the selection of the proper material of which the nozzles were made, and in the design and disposition of them in relation to the work and service required. Such troubles as had arisen had been due to incorrect application or carelessness in design. When due care and intelligence had been exercised, neat gas combustion systems were fool-proof and trouble-free. He had in mind a gas furnace of modern design where the bunsen burners had given so much trouble that it was about to be displaced by an electric furnace. This furnace was fitted with neat gas burners, since when it had given unqualified satisfaction, and the manager of the workshop had decided to adopt this system of heating in future.

Mr. A. J. Skinner (South Metropolitan Gas Company) said he was an enthusiast on the subject of using neat gas flames for industrial work wherever possible. The heat evolved was the same whether they burned fuel in the form of neat gas or pre-aerated, either partially or wholly. The difference in the result lay in the speed of the reaction producing the heat, so that in similar conditions where both fuel and air are at normal temperature, partial, and to a greater extent whole, pre-aeration produced a higher temperature according to the speed of the reaction. However, as a result of the partial or whole pre-aeration the heat was evolved much more locally, and for some operations this was essential. On the other hand, the great bulk of their problems lay in what might be called the low or medium temperature fields, up to 1,000°C., and they rarely came across the necessity to produce heat locally.

Why, then, were most of the burners produced for these operations of the partially pre-aerated type—*i.e.*, bunsenized. In the majority of cases the only answer appeared to be that users clung to the fetish of tradition.

When material had to be heated the usual requirement was that its temperature should be equal throughout the piece, and the bunsen burner was not a good one for securing this result, for the immediate surroundings of the flame would be intensely hot, with the temperature falling away more or less rapidly as distance from the flame increased.

With the neat gas flame combustion was more delayed, and it was very striking what length of flame was obtained from very small jets at normal pressures, so much so that under normal induced draught conditions the length and lift—if horizontal—of flame must be seriously considered. The Author had done some useful work on this. What ideal conditions they had with such long flames for the even heating of the inside of a combustion chamber and indirectly of the medium to be heated! The neat gas flame compared advantageously with the bunsen flame as a radiator and, since throughout the length of the flame the projected area did not vary a great deal, it was evident that the radiation from the flame throughout its length was not substantially altered. There were, of course, precautions to be observed in applying these flames; there must be sufficient draught (or pressure) to cause adequate inflow of air to support combustion, and sufficient space for combustion to complete itself under the slower conditions. One large flame, however, might be divided into a few or many smaller, and so be adaptable to different conditions.

The neat gas flame was kinder to refractories, if reducing conditions were avoided, and since the danger of backfire was absent the flame was infinitely controllable and almost inaudible compared with the pre-aerated flame, and would help the Industry to achieve a much-needed degree of standardization in burner equipment for a wide range of operations.

It was a comparatively simple matter to arrange for neat gas jets or tips of different capacities to go into the same burner bar, and they did not have to worry about uninstructed users interfering with adjustable controls on air chambers as the fancy took them.

The infinite controllability of the flame rendered the application of automatic regulation free of the turn-down ratio in the bunsen burner, and this was a great help to the designer and to the regulation equipment manufacturer. Some industrial gas engineers might have avoided neat gas flames for many operations because they were afraid of "sooting," but this did not occur in many cases.

What were the conditions of use in which a gas of given composition would cause "sooting"? This was only one of many queries in the mind of the engineer as he designed his plant.

(1) Could more gas be burned in a chamber of given size if the gas was pre-aerated and to what extent? What governed the rate of combustion per cubic foot of space and, for given conditions, what might be expected?

(2) What rates of heat transfer might be expected through muffle walls?

(3) How long would it take to bring a furnace of given heat capacity and construction to a required temperature?

(4) What rates of heat transfer could be obtained through tube and tank walls into water or other media under differing conditions, and why?

(5) What was the most favourable diameter and length, related to gas rate, for heat transfer at a given efficiency? There were empirical figures, but there should be a fundamental approach.

Mr. L. T. Minchin (Gas Light and Coke) said that several people had expressed surprise that gas engineers had discovered the advantages of non-aerated flames so late. He would suggest this was due primarily to the changes in gas quality which had occurred since the middle of the last century. If they had supplies of high-candle-power coal gas to deal with to-day, even the persuasive powers of Mr. Waites and Mr. Chandler might fail to make them scrap their bunsen burners.

There were many things which they did not yet understand in connexion with the non-pre-aerated burner, and it was probably a realization of this which rightly detered them from too precipitate a change-over. For example, the commonest type of burner, the industrial jet, had an orifice which was a minute slit. The flame which emerged was, as one might expect, laminar, but the plane of the flame was at right angles to the slot from which it issued; so evidently the three-dimensional flow pattern at the base of the flame would need further study before they could really be said to understand this flame. There was also a lack of fundamental knowledge on the variation of temperature, air requirements, and composition from point to point within the flame. The deposition of carbon occurred in circumstances which it was very hard to predict at present; in some cases sooting did not occur when it would be expected; in other cases it occurred when they did not expect it. Finally, the influence of gas quality was an unknown factor at present. They did not know what the effect of foreseeable changes in gas manufacture might be on the size and behaviour of the flame. For all these reasons it was desirable that the enthusiasm which was generated by the non-aerated flame should be tempered by caution.

Mr. R. F. Hayman (Gas Light and Coke) remarked that the Paper recommended the substitution of neat gas for aerated burners to some extent, and while he did not want in the least to minimize the valuable properties of neat gas jets, he wanted to point out examples where the case for substitution was not quite as strong as the Paper suggested. The Author observed that " pre-aerated gas burners are, of course, eminently suitable for many industrial processes . . . . . " He (the speaker) would prefer to substitute "essential" for "eminently suitable," particularly as the statement was qualified by the words "the pre-aerated burner has a field of use in which it is unsurpassed." For high B.Th.U. inputs air blast gas was essential—*e.g.*, for high temperature crucible furnaces, annealing and hardening furnaces, and other equipment where high speeds of operation and recovery were needed. Again, high pressure or pre-mixed gas was essential for operations such as glass blowing, typical examples being the sealing of valves and lamp bulbs, and for immersion heating—*e.g.*, for large scale type and lead-melting pots. The Gas Light and Coke Company's industrial load was divided roughly into 10% air blast, 10% high-pressure gas, and 80% low-pressure gas. Thus only 80% of the load was potentially convertible to neat gas firing. He agreed with most of the Author's expressions in favour of neat gas jets, but emphasized that it was far easier to overload a neat gas system than an aerated flame system, and this in certain cases might be disadvantageous.

An example might be quoted from his own recent experience. They had to design an indirect fired air heater to raise 4,000 cu.ft. of air per hour to about 800°F. Bearing in mind the advantages of operating neat gas jets at low pressures, a state which they feared might be prevalent during the coming winter, it was decided to play for safety, and relatively large jets were inserted. The finished heater was more efficient than calculated, and to carry out the duty required it was necessary to operate at a pressure of $\frac{1}{10}$ in. W.G. At this low pressure the jets had a long and very luminous flame and sooted up the lowest bank of heater tubes. It was necessary to remove the jets and replace with smaller ones. It was thus very desirable to plan neat gas installations so that at the minimum pressure likely to be encountered (in this case about 1 in.) good stable flames resulted.

Mr. W. J. Johnson (Wandsworth) suggested the Paper was part of a crusade, and, like all crusades, it seemed to him to go too far. Take the salt bath furnace described in the Paper. He did not see where the design was simpler than the G.L.C. furnace, and he doubted if it was cheaper in first cost. He also thought the Author should have given some idea of the limitations of the neat gas flame, and he did not like the stress laid on cheapness in first cost. No salesman worth his salt was afraid of first cost provided he was offering good value and service. Finally, he disagreed that the Bray jet burner was easier to maintain. This burner had given trouble in bakers' steam tube oven conversion due to gas cracking and choking of the burner jets. When this occurred maintenance became not only difficult but an irritation to the consumer.

Mr. L. F. Randall (South Metropolitan Gas Company) said that he was not so concerned with the technical aspect of the case which had been presented but with the consumers' appreciation of neat gas burners. He had found, particularly with the larger types of burner, that maintenance problems were considerably minimized, and special contracts could be entered into with safety for carrying out periodical maintenance at a price which was reasonable to both parties. He was not quite so happy about some of the smaller types of burners which consisted of a manifold with a large number of brass cased jets, but he believed that when heat resisting and other materials became available, the jets would be constructed so that they would stand up to the more arduous conditions much more satisfactorily.

The type of burner which the Author had described, which consisted of a cast-iron manifold with projections which were drilled and machined to accommodate the steatite fireclay tip, would overcome all the difficulties which had been experienced with the brass-cased jets.

(*Concluded on p. 845*)

Thoughts on Industrial Research

Dr. C. C. Paterson, O.B.E., F.R.S., Director of the General Electric Company and Director of Research at the Company's Wembley Laboratories, gave an informal Address on "Some Thoughts on Industrial Research" at a largely-attended meeting of the London and Southern District Junior Gas Association at Gas Industry House on Nov. 23. Mr. L. W. Andrew, the President, was in the chair.

Dr. **Paterson** said the first function of industrial research was to give scientific service to the industry with which it was connected. He went to the G.E.C. at Wembley with a view to trying to remove empiricisms. He wanted a laboratory that was in intimate contact with all the factories of the Company, and that would give them nothing but scientific service. They set out to have an organization with all the necessary resources, staffed by a collection of experts working in a well-equipped laboratory in collaboration with all the factories, and they asked the factories to be frank with them. He had never regretted that decision, and he urged that that was the wisest way to look upon industrial research. The staff became intimately associated with the processes and the outlook of the industry, and were able to build up inside their laboratories almost a replica of their different factories. It was some years before anything really striking came out of their efforts, but they worked throughout with the idea of giving scientific service first. Their "dash for glory" research represented 20%, development work 43%, and "trouble shooting" about 37%.

As an example of scientific service, he mentioned their work on glass. Previously the factory had depended on the empirical handling of glass, and about 160 bulbs were used for every 100 lamps turned out. They found there was not sufficient knowledge, and therefore control, of such things as glass characteristics and the need for uniform conditions in the rapid machining of glass. It took years to get the process rigidly under control, but when the war came and they were called upon to meet extraordinary requirements they were able to make the special glass needed for the war effort, glass to metal seals, and so on, solely because of the thorough knowledge they had acquired in the past. Much the same might be said about the handling of refractories; indeed a thorough knowledge of refractories was the secret of making glass, and he imagined it must also be the secret of economic operation in the Gas Industry. Research must be on a certain minimum scale, but a lot of units in industry could not afford it, and so industrial research associations were established during the last war. He had intended saying something about how to marry the research organization with the industry it served, the internal structure of research laboratories, and something about staffing and staff responsibilities and authority, but he would content himself with what he had said in the hope that there might be a helpful discussion.

Valuable Training Ground

Dr. **H. Hollings** said a contract of marriage required very careful thought, and a contract of marriage between master and servant sometimes presented very delicate questions. It would be well therefore to get their minds clear on those relationships. While it might be true that in a sense the research department gave guidance to the other departments, it was also true in another sense that the research department must be the servant of the other departments within an industrial organization, and for that reason he suggested that it was of paramount importance that the research department, the production department, and the commercial department should face up to the question of their respective functions and their relationships the one towards the other. If a satisfactory relationship was established he believed that the research department could become a very valuable training ground for the staff. That was important from the point of view of the junior personnel of the research laboratory, because it secured for them an avenue of promotion and a means of transfer if for any reason as they grew older, and as they gained more experience of the industry in which they were engaged they felt they were better fitted for work of a different character from that which they envisaged when they first graduated or entered the industry.

Broadly speaking, the function of an industrial research laboratory was to see that the results of the more purely academic work were applied in industry. He would suggest, however, that in each industrial laboratory a proportion at least of purely academic work should be undertaken. That, of course, presupposed that the research unit was of a certain minimum size. He agreed with Dr. Paterson's view that there was a certain minimum economic size necessary for an efficient organization. In any laboratory in industry a proportion of purely scientific or academic work had a leavening influence throughout the organization. It had a far-reaching effect in maintaining the scientific standard of all short-term *ad hoc* investigations, or "trouble shooting," and helped the whole of the staff to keep their scientific information and knowledge up to date. It had been suggested that it was a good thing to have one centralized laboratory for all the research and testing work of an industry, but his own view was that even at the expense of a little overlapping it was advisable to have at least two such centres. His chief reason for that suggestion was that if all the activity became centred in one place and one group of people, all might go well for a while so long as the organization was moving forward under the various stimuli which gave rise to its existence, but there was a risk that after a few years the quality of the work might fall, due to the absence of properly informed criticism from outside.

In the case of a research organization associated with an industry it was important to remember that it had not the same opportunities for contact with other laboratories as existed, for example, in a university laboratory, nor was there the same steady recruitment of staff that existed in a laboratory attached to a university due to the normal inflow of students. If a research establishment became too self-contained there was a real danger of a certain inbreeding of ideas. His view was that each such establishment should have the benefit of constructive criticism from at least one other similar organization associated with the same industry, and having a certain community of interest. The two or three research organizations which he envisaged need not and should not be engaged upon exactly the same kind of work. They should guard very carefully against the temptation to copy one another, but they should have a common interest in the prosperity of the same industry. For successful co-operation on the lines he suggested it would be necessary that the two laboratories should represent a certain equality of size and shape of organization. They should contain staffs of approximately equal attainment in their respective fields, so that while they criticized one another, they might still retain one another's confidence and respect.

Staff Recruitment

It was only to a very limited degree that research or any other creative work could be organized, standardized, or controlled; its success depended on such a variety of personal and human considerations. One of the most important was the proper recruitment of staff. In a research laboratory, unless staff matters were right, obviously nothing else could be right. There should be a proper distribution of age-groups, for reasons which should be fairly obvious. That question presented peculiar difficulties at the present time, because they were now feeling, and were bound to feel for some years to come, the effects of two major wars. Recruitment should be effected from different fields, keeping a proper balance between men trained in the universities and men trained in the industry. There should also be a proper balance between recruits, bringing out different points of view from different universities and schools. He believed a research laboratory should be so organized and staffed that when once the initial responsibility had been fixed at the top, there should be the greatest possible freedom for the flow of suggestions and initiative from the bottom upwards. That, of course, called for a very high order of team work and mutual confidence, and that was why he stressed such questions as the recruitment of staff and the establishment of proper relationships between the research department and the other departments of the undertaking. With regard to the relationship between the seniors and juniors in the research laboratory, it was important that everyone should be clear as to the objective and motive in any research project. In research connected with any new process the economics of the process might be obvious. On the other hand, the economics might be doubtful, and only technical possibilities would be investigated in a preliminary way. There were sometimes quite different objectives in starting a piece of research. For example, research on some high-pressure commercial process or into the physical behaviour of gases under high pressure might sometimes be quite properly started with the primary objective of educating the staff or the industry with which the laboratory was connected in high-pressure technique. Sometimes a research might be justified as an exercise to enhance the prestige of an organization. Whatever the objective was, the director and the senior workers concerned should be quite clear as to the category in which the work fell. The motive or objective might change as the work proceeded. Research work was a very personal and individual affair like any other creative art, and therefore called for the closest understanding and confidence between all concerned.

Dr. **J. G. King**, Director, Gas Research Board, said that in the early days there was very poor connexion between the research department and the Industry it was intended to serve. During the last war the Department of Scientific and Industrial Research visualized the possibility of industrial research associations. It was intended that they should at first be State-aided, and eventually the industries would take them over and support them. The Department no longer held that view, but thought the research associations in the big industries should be supported from Government funds. One reason for that was the improved approach through the Department itself to academic life, and another was the approach from one research unit to another. There were some 30 research associations, and each could offer some service to all the others. For instance, practically every industry used fuel in some form, and if, say, the electrical industry had a gas research problem, it could come to the Gas Research Board for assistance. He advocated wider co-operation in research, with each association taking in its neighbour's washing.

Mr. **J. E. Davis** (South Metropolitan Gas Company) said the "dash for glory" type of research was most often entirely individual. Research that was concerned with making use of knowledge often

failed because they did not make enough use of all the organized knowledge that existed. The real job of the research department was to see how fundamental knowledge could be applied in industry. There were people who felt this country had not been as progressive as some other countries in taking the idea of research right on to the big scale and trying it out. Where new ideas had come into industry it had usually been because some sportsman with plenty of money had backed his fancy. There were a lot of sportsmen with plenty of money, but if research was to be carried through to the fruitful stage there must be strong development associations linked with industry, and preferably right in industry itself.

Dr. J. W. T. Walsh, in charge of the Photometric Section of the National Physical Laboratory, spoke of the contribution made by the N.P.L. to industrial research, more especially in regard to the maintenance of standards of measurement.

Mr. P. Good (British Standards Institution), recently back from the United States, said one of the earliest discoveries in research was the lack of knowledge in industry of the properties required in materials, and a greater lack of measuring and assessing those properties. In the early part of the century a start was made in preparing standards, and that work was still proceeding. Enormous strides had been taken and enormous improvements made in the properties and qualities of materials.

Dr. S. Pexton (Gas Light and Coke Company) said a problem in research was the magnitude of the plant with which they were dealing, and the length of life the plant was expected to operate. In large-scale plant they were faced with having to wait a generation before they could make a change. Coming to works practice where it was possible to isolate and circumscribe a problem for investigation within small confines, such as benzole recovery from coal gas, although they were dealing with something new, they had been able in the short space of about four years to establish and bring into full scale operation an entirely new process.

Mr. W. R. Hebblewhite (Standards Association of Australia) gave an account of the work on standardization in Australia on similar lines to that of the British Standards Institution in this country.

Mr. R. F. Hayman, Mr. J. E. Cooper, Mr. S. Holgate, Mr. P. F. F. Clephane, and **Colonel Lloyd** also spoke; and the **President**, in winding up the discussion, said that in all research teams there must be a very real pride, firstly in the scientific truth of what they were doing, pride in the industry they were serving, and pride in the team.

Dr. Paterson briefly replied, and a vote of thanks was accorded to him and the other guest speakers on the motion of Mr. F. C. Smith, seconded by Mr. R. F. Twist, and supported by Captain W. J. Liberty.

Removal of Hydrogen Sulphide from Fuel Gases*

(*Concluded from p. 813*)

Evaluation of Oxides.

The static test of H. Brückner† will differentiate between oxides which will react with H_2S and those which are completely unreactive, but other information given by this method, and by the oxidation stage applied subsequently, is of very limited value on account of the absence of control of porosity and of temperature.

In the accelerated test described in this Paper, the results are chiefly of interest on a purely comparative basis. They show the best performance which may be expected from the individual forms of oxide, but to some extent the differences are exaggerated. This is due to the fact that an active material leads to an appreciable rise in temperature in the system, and therefore benefits further from this cause.

At the same time, the test does approach the conditions of works practice, particularly in that the oxide is actually in contact with all the components of the fuel gas; some of these may materially alter the rate of reaction by the fact that they are absorbed on the surface. The similarity with full-scale conditions becomes more pronounced as the actual space velocity used in practice is increased.

Chemical analysis and determination of porosity, together with the tube test described above, should give a very clear picture of the value of any specimen of iron oxide.

Large-Scale Tests

Two series of tests have been carried out with iron oxide in granular form, one in two steel towers and the other in a box of reinforced concrete.

The towers were both 2 ft. in diameter and had a packed space 8 ft. 6 in. high, giving a total oxide volume of 53 cu.ft. Gas from the inlet to the works purifiers was pumped throught a tar extractor‡ and then to the bottom of the first tower. After leaving this vessel, it passed similarly to the bottom of the second tower.

Means were provided for feeding pellets to the top of the towers and for withdrawing from a discharge hopper at the bottom. The purifying material was prepared by mixing 3 parts of commercial $FeSO_4.7H_2O$, crushed to pass $\frac{1}{16}$ in. sieve, with 1 part of powdered slaked lime and wetting the mixture with a small stream of water in a rotary drum. The reaction, described above, produced iron oxide held by plaster-of-paris in spherical pieces or pellets which were graded to pass $\frac{3}{4}$ in. and stay on $\frac{3}{16}$ in. They were dried on steam-heated trays to a water content of about 14% and a pH of 8.0; as used, 53 cu.ft. weighed just over 1 ton. The back-pressure from the towers was 2 in. W.G.

Coal gas was passed through the towers in series at 4,000 cu.ft. per hr., and removal of H_2S was for a time complete. Not until 380,000 cu.ft. had been treated did the outlet concentration of H_2S reach 1 part per mill. The oxide pellets were then moved counter-current to the gas stream by adding fresh material to the top of the second tower, and material discharged from the bottom of this to the top of the first tower, while the oxide from the bottom of the first tower was rejected. The rate of travel of the pellets was adjusted so as to give satisfactory purification of the gas. During this process, 800,000 cu.ft. of gas were treated and 28.3 cu.ft. of oxide were rejected; the inlet H_2S averaged 335 gr. per 100 cu.ft., and the outlet 0.6 parts per mill. The material withdrawn contained about 20% sulphur, its moisture content remaining unchanged. This agrees well with the calculated figure of 21.6%. It is clear that even lower outlet concentrations of H_2S could be obtained by using a deeper bed of material, or by increasing the rate of withdrawal.

A later test was made with carburetted water gas, using pellets from the coal gas run which had been revivified by exposure to air, and which contained 17% moisture and 10% sulphur. The gas rate was again 4,000 cu.ft. per hour, and oxide pellets were moved as before. No unused oxide was employed, all additions being from the once-run material: 660,000 cu.ft. of gas were treated, and 16.2 cu.ft. of oxide rejected; the inlet H_2S was 165 gr. per 100 cu.ft., outlet 0.4 parts per mill. There was 22.3% sulphur and 15.2% moisture in the pellets discharged.

In standard oxide box practice, the treatment of 4,000 cu.ft. of gas per hour would require 4 boxes, each of 48 sq. ft. cross-section and with an effective depth of 16 ft.; the oxide volume would therefore be 768 cu.ft.

The sulphur content of the discharged material is lower than is customary in oxide purification, and it is doubtful whether a figure above 30% could be reached by successive foulings. The material, however, lends itself admirably to extraction of the sulphur by means of solvents, and the extracted pellets are then as reactive as those newly-made.

The second unit tested consists of a concrete box fitted as a catch at the outlet of a plant for the catalytic removal of organic sulphur from a maximum of 2 mill cu.ft. of gas per day. It contains 4½ tons of pellets similar to those described above, packed into a volume of 234 cu.ft. Gas from a scrubber-cooler is passed downwards through a single layer of the oxide 4½ ft. in thickness, and the removal of H_2S is complete. Figures are not yet available to show the life of this material.

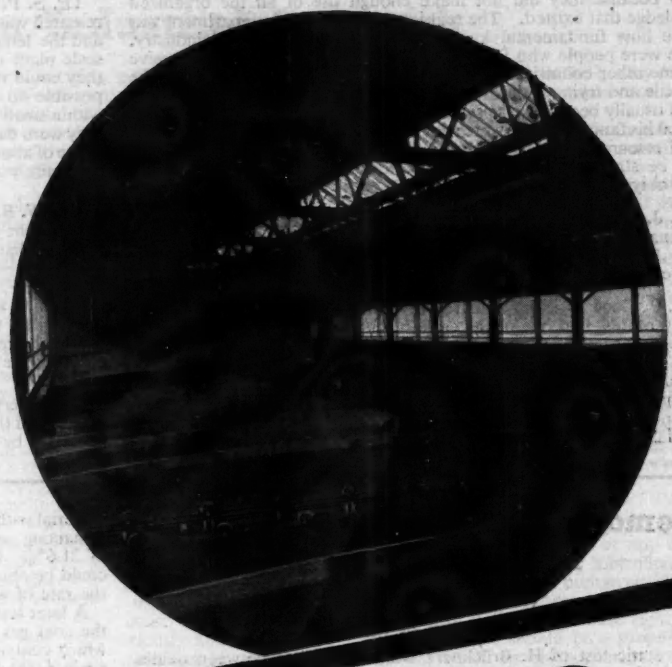
These results indicate the high reactivity of pelletted oxide. Similar tests are in hand with oxide tablets, made without any binding agent.

* Institution of Gas Engineers Communication No. 288.
† *Brennstoff-Chem.*, 1936, **17**, 21; *Gas-u. Wasserfach*, 1938, **81**, 822.
‡ *Cf.* British Patent No. 560,798, Gas Light and Coke Company and L. Silver, 1942.

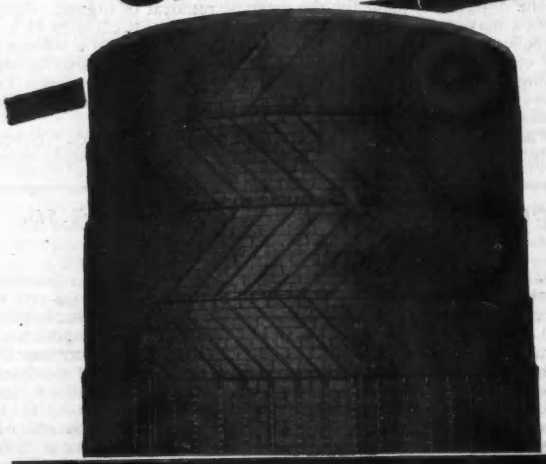
INDUSTRIAL APPLICATIONS, ETC.—concluded from p. 843.

Author's Reply

Mr. Waight, replying, said that the bulk of the apparatus described in the Paper had been installed after the wartime change-over to debenzolized gas, but during those periods when the benzole plant had been out of operation very little trouble had been experienced. Mr. Minchin had underlined Mr. Skinner's remarks concerning the re-examination of existing data. Such a research would doubtless produce extra information on the physics and chemistry of the neat gas flame. The Author said that he had found a Paper by R. F. Davis very useful. This Paper, "The Mechanics of Flame and Air Jets," was read to the Institution of Mechanical Engineers in 1937. In answering Mr. Hayman, Mr. Waight agreed that the pre-aerated burner was preferable when it was necessary to obtain a high rate of heat release per unit volume of combustion space. Speakers had mentioned cases in which the Bray jet had given trouble, due in the one case to condensation, and in the other to workshop conditions. Mr. Waight felt that such troubles did not indicate an inherent disadvantage in the neat gas flame, but rather that something was wrong with the method of its application. Mr. Johnson had doubted the wisdom of putting forward a salt bath fired by low-pressure gas without first enquiring about the amount of work to be treated. Of course, each job must be treated on its merits, and salt baths such as that described in the Paper were only proposed to consumers after ensuring that the work which had to be done lay within the capabilities of the furnace.



GAS PURIFIERS
GAS HOLDERS



GAS WORKS PLANT

Gas Condensers. Tar Extractors.
Tar and Liquor Separators.
Ammonia Washers-Purifier.
Naphthalene Washers.
Benzole Washing, Extraction and Refinery Plant.
Gas Dehydration Plant.
Tar Treatment and Distillation Plant.
Ammonia Liquor Concentration Plant.
Sulphate of Ammonia Plant.
Gas Heaters and Humidifiers.
Gas Valves—Gas Holders.
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Balloon Barrage Purity Meter

By W. F. GARDNER, B.Sc., A.R.I.C., and R. E. NORRIS,

of the Chemical Department, South Metropolitan Gas Company

THE contribution of the Gas Industry towards the maintenance of hydrogen supplies for barrage balloons throughout Britain was ably recorded in the Paper presented at the recent summer meeting of the Institution of Gas Engineers, and many of the audience must have been impressed by the difficulties of the task of providing, at very short notice, large volumes of hydrogen of a high degree of purity.

It can be readily appreciated that the onset of this sudden demand stimulated thought regarding methods of separating pure hydrogen from existing hydrogen-rich industrial gases, and of using the supplies of hydrogen already available in the most economical way. In the former connexion the separation of hydrogen from coal gas by diffusion was examined experimentally in the laboratories of the South Metropolitan Gas Company early in 1940. Although no difficulty was experienced in obtaining from coal gas hydrogen of 94% purity, it seemed very clear that production of the gas by such a method would be costly. In view of the difficulty in the early days of meeting the demand for hydrogen, those responsible for balloon operation decided that hydrogen in a balloon could be diluted with a proportion of coal gas (up to about 20%) without excessive loss of lifting power. Accordingly coal gas services were laid on to a considerable number of balloon sites so that gas could be drawn as required, thereby reducing by an appreciable amount, the volume of hydrogen consumed.

Testing

As soon as coal gas was used a difficulty arose in connection with the testing, on the actual balloon site, of the purity of the contents of balloons. With hydrogen it was the custom to make tests at intervals (of 24 hours or so) to ascertain the proportion of air which had diffused into the balloon. If sufficient air was present to yield an explosive mixture with the hydrogen a dangerous explosion would occur if a spark of atmospheric electricity ignited the mixture. Consequently, when the explosive range was approached the gas in the balloon was discharged to atmosphere and the balloon was reinflated with fresh hydrogen. This operation called for as much hydrogen as was used during a month of normal daily replenishments, and would be undertaken only when the approach of dangerous conditions was indicated by the test result. Accuracy of testing was therefore of particular importance in avoiding unnecessary deflations and waste of gas. The purity meter in service at the outbreak of war measured the percentage of hydrogen in the mixture, and depended for its operation on thermal conductivity. This property afforded a reliable method of analysis for simple mixtures of hydrogen and air, but when one of the components was itself a complex mixture like coal gas the readings of the meter could no longer be translated into terms of air content.

Metro Purity Meter

A device was therefore needed that determined the actual oxygen content, and to fulfil this need the "Metro" purity meter was designed and supplied.

For oxygen determination a specific reagent was desirable, and it was clear that the hydrogen in the mixture would serve as reagent if selective combustion of the oxygen with the hydrogen could be brought about. The water formed could then be condensed by cooling, and the contraction in volume, or the reduction in pressure at constant volume, measured and the percentage of oxygen deduced. This procedure would avoid the use of liquid reagents, which were out of place on balloon sites. Combustion could be very conveniently effected by a platinum filament, heated electrically by current drawn from the accumulator of the engine driving the balloon winch, but it remained to be shown whether by such a method of heating the reaction could be restricted to oxygen and hydrogen. On combustion of hydrogen and oxygen, the volume contraction is three times the oxygen content (if hydrogen is in excess), but with coal gas present there is the possibility of some of the oxygen uniting with other combustible gases for which the 3 : 1 ratio does not hold good. It was shown experimentally that the combustion of constituents other than hydrogen could be avoided by keeping the filament temperature as low as was compatible with reasonable speed of combustion—in any case well below red heat. The temperature of the filament depends on the electrical input, the atmosphere surrounding it (H_2 conducts heat much better than most other gases), the surface area of the wire and the shape of the enclosing vessel, and a considerable number of experiments were carried out to determine the most suitable diameter and length of wire to employ. The shape of the filament vessel was found to influence considerably the time taken to complete a combustion, inasmuch as certain shapes promoted convective flow of the gas over the surface of the filament. It was found that a tall narrow vertical cylinder, with the filament mounted axially in the lower half, gave the shortest combustion time. The salient features of a hot filament purity meter were thus established, and after laboratory confirmation in glass vessels the first model "Metro" purity meter was produced in collaboration with the South Metropolitan Gas Company's meter making and repairing shops. The meter was robust, and constructed entirely of brass except for a capillary glass U-tube serving as a mercury differential pressure gauge.

Method of Operation

The meter consisted of a pair of similar cylindrical chambers mounted vertically and close together in a water jacket (water containing an anti-freeze preparation). The test vessel, with the filament mounted in its lower portion, was provided with top inlet and bottom outlet cocks to enable a gas sample to be aspirated through it; the other vessel had a single cock to open it to the air as required. The latter vessel acted as a compensator to eliminate errors due to the small changes in temperature which are inherent in the method of test. Each vessel was connected by a capillary brass tube to one limb of the differential mercury U-gauge so that, should the water bath change in temperature, the gaseous contents of both tubes would be similarly affected and the gauge would remain undisturbed.

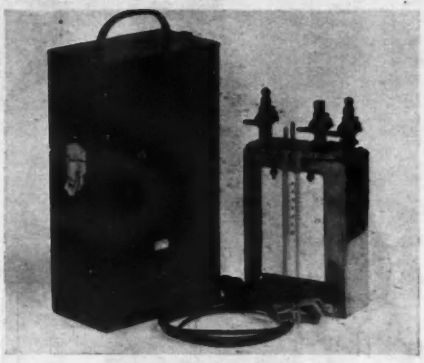

PLATE I.

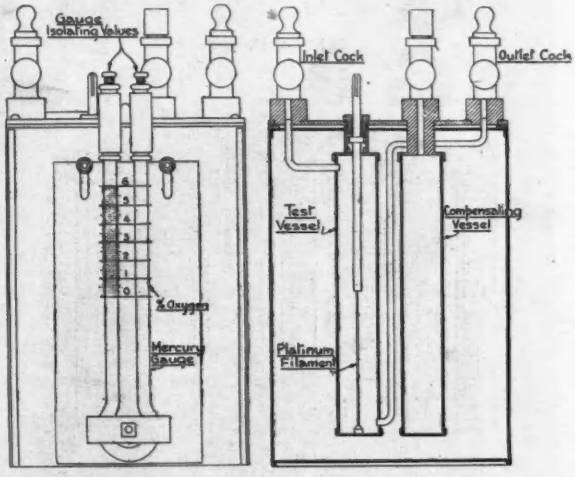

FIG. 1.

Having drawn a gas sample into the meter the pressure in both vessels was adjusted to atmospheric and all cocks were closed. The filament was heated by a 6-volt car battery for a few minutes whereby the oxygen in the test vessel was consumed. On disconnecting the battery and cooling a pressure reduction was evident in the test vessel, and the mercury level in the appropriate gauge limb ascended and registered the change of pressure. The U-gauge scale was graduated to read percentages of oxygen direct. The instrument was supplied in a wooden case, provided with a vertical glass window for

reading the U-gauge. The case also contained india-rubber suction bellows to draw gas samples from the balloon into the test vessel, and a cable to connect the instrument to the car battery. The first of these instruments was officially certified and used as a master standard against which all subsequent instruments were checked, and it made subsequently thousands of tests and still gave perfectly accurate results. This model is shown in Plate I, and in fig. 1 if the gauge isolating valves shown therein are omitted.

Difficulties Surmounted

This first type of instrument showed one serious defect in service inasmuch as the mercury was liable to be lost from the gauge into the gas vessels should the meter be overturned. This was obviated in a second model by providing a small spring-loaded, rubber-faced mushroom valve in each brass gauge cap to isolate the gauge from the

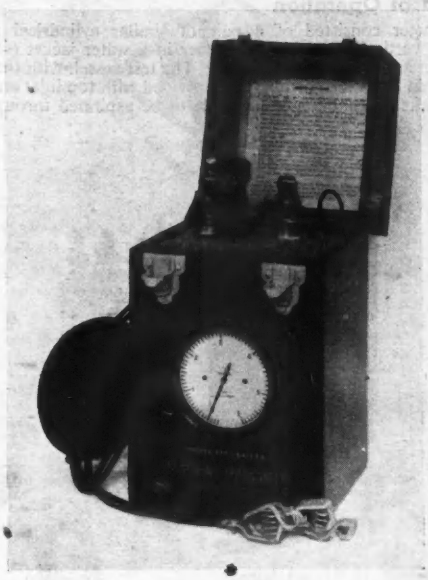

PLATE II.

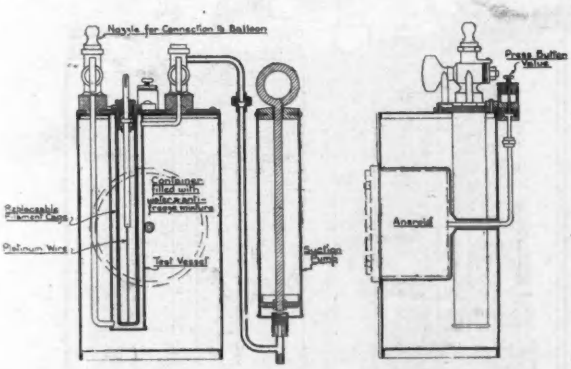

FIG. 2.

rest of the instrument. The valves were opened by finger pressure when a reading was to be taken. Despite this improvement the mercury was still a source of trouble, occasionally becoming sluggish despite the presence in the tube of a surface tension reducing lubricant. Eventually it was decided to replace the U-gauge by an aneroid indicator. As differential aneroids were not available the purity meter was modified so that a 3-in. diameter, flush-mounting, aircraft type instrument could be utilized. The compensating tube had to be dispensed with, but the temperature error was reduced to negligible proportions by increasing the volume of water and therefore the thermal capacity of the water jacket, and sinking the aneroid in a closely-fitting recess in the water jacket so that the aneroid was at the temperature of the water. The aneroid was isolated from the combustion vessel by a single press-button valve, connexion being made only when taking a reading, and the scale was graduated to read percentages of oxygen. The instrument covered the range 0–6% of oxygen, and tests could be completed in about seven minutes. This model is shown in Plate II and fig. 2.

Possible Uses for Meter

The purity meter was designed and made to satisfy a very unusual need arising out of defence operations, and nearly 7,000 of these instruments were supplied to the authorities, but it seems unlikely that a demand for such a meter can develop on any appreciable scale in peacetime. It has been suggested, however, that it might be useful on a gas-making plant for testing the atmosphere in mains or vessels when purging operations are in progress, and this application is under consideration. Should, however, there be no peacetime demand for such a meter, it is felt that the effort expended in design and production was a useful, if small, contribution to ease the difficulties of those responsible for maintaining the balloon barrage in the early days, and that the above brief history should be put on record.

The Authors wish to thank the Directors of the South Metropolitan Gas Company and the General Manager, Dr. E. V. Evans, for permission to publish this record, and also to acknowledge the contribution of Mr. C. H. Smith in organizing the production of the meters.

1st Report of the I.G.E. District Heating Committee*

THE District Heating Committee was appointed by the Council of the Institution of Gas Engineers on June 13, 1944, its terms of reference being as follows:

> "To consider the principles and practice of district heating and proposals in relation thereto and their development through the methods of heat distribution which can be provided by the Gas Industry, and to report to the Council, with power to co-opt."

The membership of the Committee is: C. A. Masterman,† M.A., M.I.Mech.E., F.R.I.C. (*Chairman*); J. E. Davis, F.R.I.C.; G. C. Pearson, M.Inst.C.E.; N. S. Smith. *Ex-officio:* The President, the two Vice-Presidents, and the Hon. Secretary of the Institution. *Co-opted:* W. Hodkinson, M.I.Chem.E.; C. H. Leach, M.A.; C. E. Sanderson, B.Sc.; W. L. S. Spinks.

General

The Committee's terms of reference required it to consider systems of district heating together with alternative methods of heat distribution, and the Committee is satisfied that this is the correct manner in which to regard district heating projects. District heating does not provide a new amenity, but is one alternative method of supplying heat energy from a central source to a large number of users.

CENTRALIZED HEAT SUPPLY.

There already exist in Great Britain two well-established systems of centralized heat supply in the form of the two public utility services of gas and electricity. The introduction of a third system would become desirable if it could achieve results not possible to these existing systems, either by giving a new amenity, or by supplying existing amenities at a lower cost or in more convenient form.

The characteristic feature of district heating is that it transmits heat generated at a central source through a mains system to the user, employing hot water or steam as the transmitting medium. This form of heat transmission is well established for single buildings, where it is known as central heating. By district heating it is proposed to extend the system on such a scale and over so wide an area that it becomes a public utility service.

Systems of centralized heat supply have been developed with the object of increasing the convenience or abolishing the main disadvantages which arise from the use of raw coal in a multitude of small consuming units. These disadvantages are in part experienced by the individual and in part by the community as a whole. In the former category come such factors as the need for receiving and storing the fuel, handling it and removing the ashes, and the inability to control with precision the rate of fuel consumption to suit intermittent or varying requirements. The disadvantages to the community include the inefficient use of fuel, the amount of transport required for delivery of fuel and ash removal, and atmospheric pollution. All systems of centralized fuel supply aim to remove these disadvantages, and succeed in doing so in varying degrees. Thus, the objective of district heating is the same as the objective of the Gas Industry.

The two existing public utility services of gas and electricity are capable of supplying all the fuel needs of consumers whatever may be the function that fuel is required to perform. A district heating scheme is limited in that it can meet only those demands which are satisfied by heat at a relatively low temperature. This is not an unduly severe limitation, because the greater part of the heat requirements in most premises falls within the range capable of being supplied by district heating.

The extent to which centralized systems of supply have so far

* Submitted at the Institution of Gas Engineers' Autumn Research Meeting, Nov. 27.

† Resigned.

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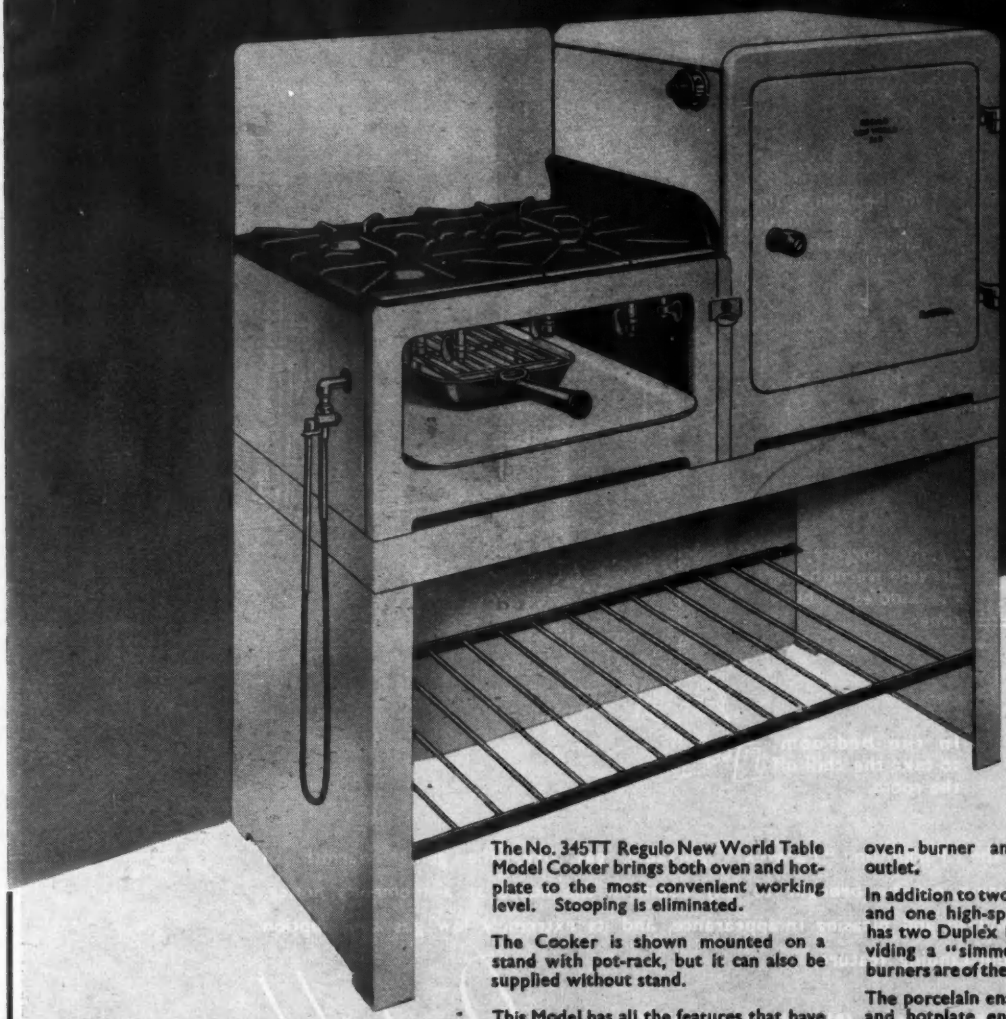

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The Cooker is shown mounted on a stand with pot-rack, but it can also be supplied without stand.

This Model has all the features that have made Regulo New World Cookers increasingly popular, including the single-oven-burner and direct-bottom-flue outlet.

In addition to two standard Rado burners and one high-speed grill, the hotplate has two Duplex burners with taps providing a "simmering" position. The burners are of the non-lighting-back type.

The porcelain enamel finish of the oven and hotplate enhances the smart and pleasing appearance of this modern design.

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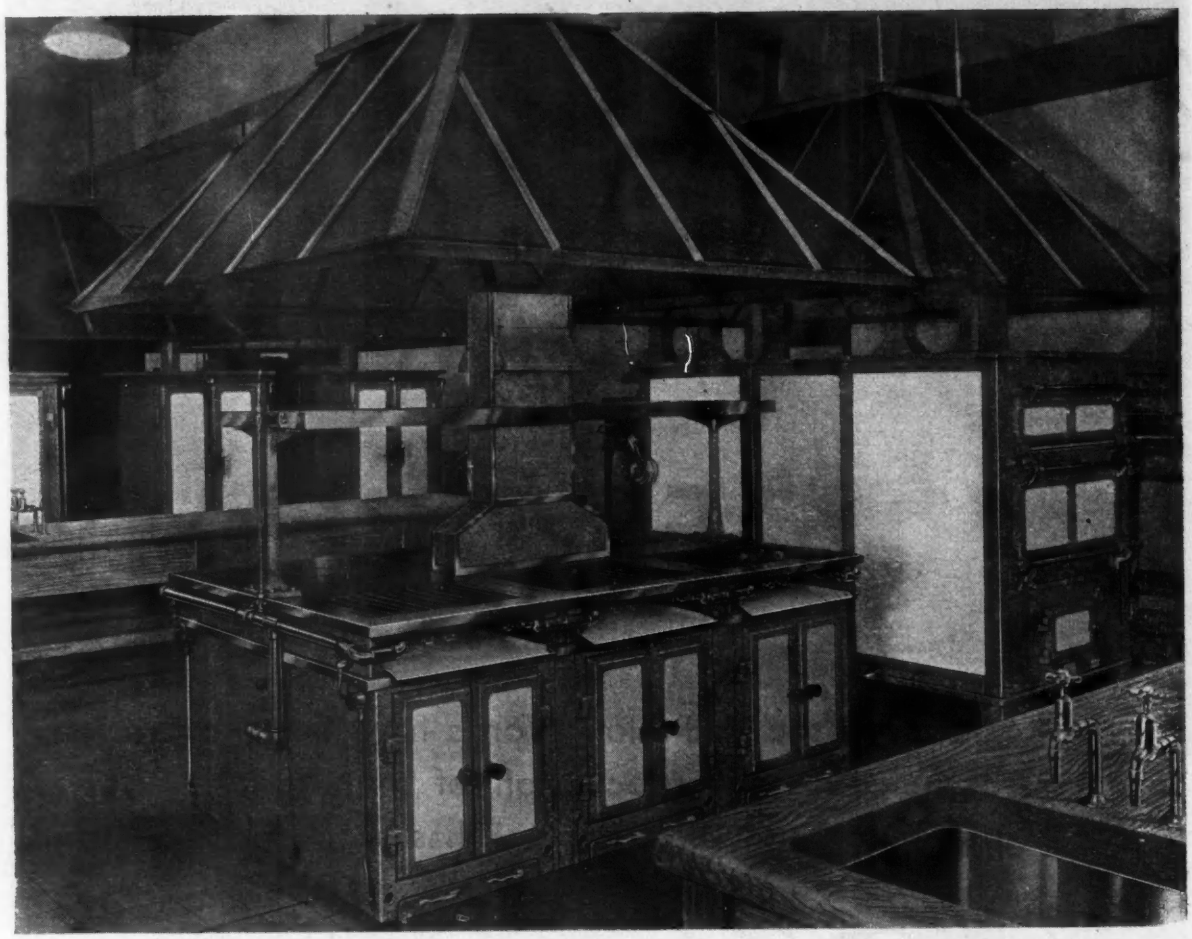

View of part of the Principal Kitchen in a large Canteen, showing Range, Baking Ovens and Roasting Ovens

The complete Kitchen planned and equipped by

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displaced the local use of solid fuel is relatively small, being about 20% of domestic requirements* and only some 10% of other requirements.

Convenience and Cost.

The degree to which centralized heat supply can be extended depends upon the balance of the two factors of convenience and cost. These two factors should be given a broad interpretation to include the saving of labour, whether paid or unpaid, the cost of storing fuel and providing flues and equipment for the use of fuel, as well as the wear and tear on buildings and furnishings resulting from the use of fuel.

A matter of primary importance coming under the broad heading of convenience is the ease with which the use of fuel can be controlled as regards place, time and rate of use to meet varying requirements. Where a high precision of control is possible, savings of fuel can be effected and operations conducted more efficiently. In such cases the economic value of this property is high. It has permitted gas and electricity to be used for many purposes and show a monetary saving, even though the price charged for these commodities is several times the cost per therm of less controllable fuels.

The economic value of precise control varies widely according to the purpose for which fuel is required and, broadly, the extent to which existing centralized systems are used represents the extent of those heat requirements where precision of control has a high monetary value.

The field not yet covered by centralized supply shows a smaller margin of monetary advantage arising from the various factors grouped under the term "convenience," and it is this field which district heating seeks to cultivate.

The possibility of district heating showing an advantage in such circumstances arises, in the main, from the low efficiencies associated with existing appliances using solid fuels.

The gas and electricity industries have demonstrated that large savings in the quantity of coal required for the performance of specific tasks can be effected by the replacement of local units burning raw coal and by the extended use of a centralized system. It has been computed that the electricity industry, by centralizing the production of power, was saving coal in pre-war days at the rate of some 17 million tons annually.† It is estimated that the operation of the Gas Industry has resulted in the saving of 15 to 30 million tons of coal annually.‡

The extension of systems of centralized heat supply to achieve further savings in the use of coal, to abolish atmospheric pollution, to reduce the transport and handling of solid fuel and generally to increase the convenience and satisfaction of the fuel user is undoubtedly an objective of high social importance.

The extent to which this can be achieved will depend upon the cost of alternative methods in terms of the monetary cost to the user, and the cost to the nation in terms of annual expenditure of coal resources.

The advantages of centralized systems of fuel supply are experienced in the highest degree by the small user, mainly the domestic user, who in the aggregate forms the largest single class of fuel users in numbers, and accounts for more than one-third of the total fuel usage of the country. The Committee has given most consideration to this group.

The Committee has noted that in many discussions on the comparative cost and comparative efficiency of various systems there has been a tendency to base discussion upon one particular function of fuel, to accept test-bench efficiencies of fuel-using appliances, and existing price levels for various fuels. This procedure can lead to conclusions which the Committee is unable to support. In its view the only sound basis of comparison is to ascertain the total requirements of the user for all purposes, to consider various systems or combinations of systems by which these requirements may be met, and to compute the total cost in money and in coal of meeting these requirements by the various proposals.

As a basis of comparison the Committee has accepted the pre-war average annual expenditure of a family on fuel as £16 16s., and the coal consumption, used either directly as such or as prepared solid fuels, gas and electricity, as 5 tons. The estimate of the money cost is derived from the survey of the Ministry of Labour and National Service in 1939, and compares closely with other similar surveys. The figure of 5 tons is less firmly established, but has been accepted as a basis of comparison by other groups considering related problems, and compares well with information obtained by Gas Undertakings in local surveys.

All figures of cost in this Report are related to the level of prices existing before 1939.

In assessing the consumer's requirements, regard has been had to the fact that the standard of fuel services obtained in most homes hitherto is well below that which would be regarded as satisfactory in future housing. The Committee is aware that this deficiency is recognized, and that there is an intention of remedying it in the future. Nevertheless, the Committee has endeavoured to avoid the error of assuming that standards will be raised to levels much higher than those experienced in the past. Note has been taken of the experience of gas and electricity undertakings, which have provided hot water supply or improved methods of heating in the home, and have learned how frequently these facilities are used only to a limited extent.

The Committee recognizes the fact that it is the consumer who decides the extent to which he will avail himself of any fuel service, and the Committee considers it a demerit of any system or combination of systems which would make it difficult for the individual to economize on fuel, and divert expenditure from this purpose to others which seem to him more appropriate. Generally, the Committee would regard it as a serious disadvantage of any system which depends for its economic operation upon coercion of the consumer as to the form of fuel or heat supply he is to use.

The above views have led the Committee to disregard economies in building cost, which can only be obtained by undue restriction of the freedom of the individual, and to assume that cost comparisons must be made on a fair basis, without any particular system receiving preferential treatment by way of subsidy or loans at low rates of interest not available to other systems.

Alternative Systems.

The availability of alternative systems and alternative fuels is regarded as being of particular importance in view of the very varying needs of different types of premises and of different consumers in similar premises. Rigid planning of fuel supply of any district of a town is likely to prove inappropriate at a later date as the occupants and uses of premises change.

It is generally known that the greatest single purpose for which fuel is used in this country is for space heating. It represents 40 to 50% of the heat requirements of domestic consumers and probably half the heat requirements of industry. The next largest single requirement is for hot water, though supplies and facilities have in the past been so inadequate that the actual use in this direction has been far smaller than is desirable. An attempt has been made to estimate in general terms the type of heat requirements of various types of premises, and the following allocations of heat are suggested as being a useful guide:

Domestic Premises.—40 to 50% space heating; 30 to 40% water heating; 20% cooking.

Offices and Public Buildings.—80 to 90% space heating; 10 to 20% hot water supply. Where cooking facilities exist the heat used for this purpose will rarely exceed 10%. Large blocks of offices show recorded fuel usages between 0.01 and 0.09 therm per cu.ft. per annum. Cinemas show an average of 0.045 therm per cu.ft. per annum, varying about 50% above and below this figure. Churches and public halls average about 0.01 therm per cu.ft. per annum, varying between 0.007 and 0.015.

The heat requirements of domestic users are considered in more detail in Appendix 1.

The Committee would stress the importance of avoiding excessive over- or under-estimates of heat requirements when making comparison of alternative systems. An excessively high estimate favours unduly such systems as have a high capital charge and low running cost. An excessively low estimate gives undue preference to a system whose running cost per heat unit is high. Thus, it is found that in a number of proposals for district heating schemes the standards of heating recommended are inordinately high, showing, in some cases, space-heating requirements as much as four times as great as those found hitherto in reasonably well-heated premises, with hot water requirements up to double those which experience has shown to be probable.

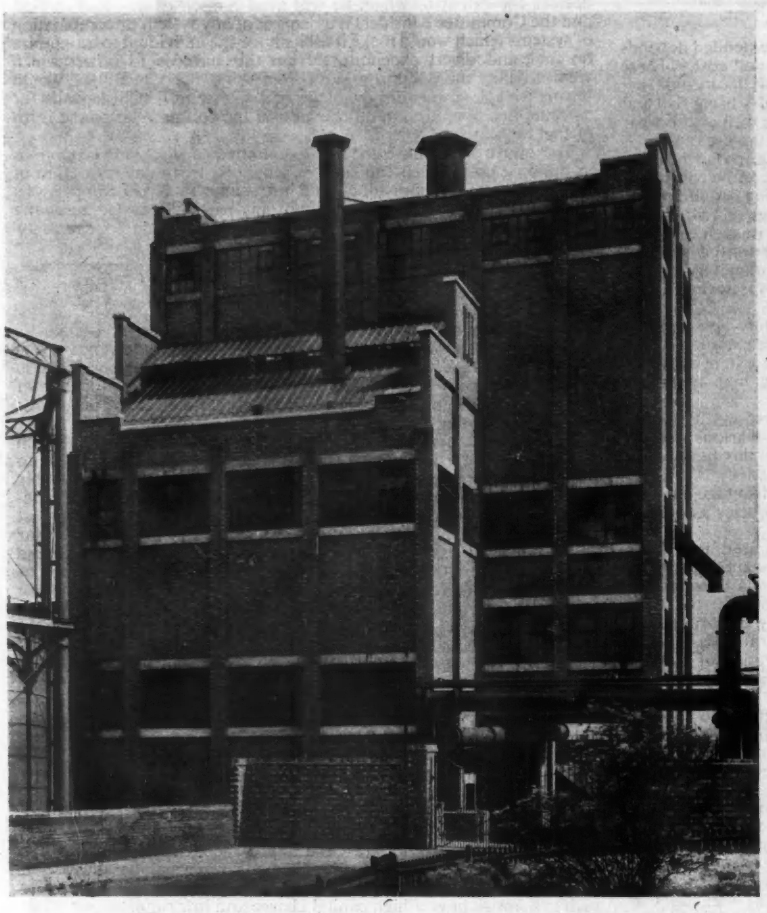
The Committee believe that in the British climate the majority of users, and certainly almost all domestic users, will require a substantial proportion of the space heating to be by radiant heat from a high-temperature source. This may be due to the fact that in Great Britain the winters are not cold by comparison with continental climates, but are rather dull and damp, and that the summer months are not without their chilly periods; but, whatever the reason, the preference for radiant heat is one well attested by the experience of gas undertakings.

The Committee recognizes that intermittent heating of a house by radiant heat does not alone give satisfactory conditions, and that some measure of background heating is desirable. This is desirable not only to maintain a comfortable temperature, though this is valuable, but more from the point of view of preventing the fabric of the house and the contents of the house from becoming chilled to such an extent that a sudden change in the weather leads to the condensation of moisture on walls, furniture, &c.

While hot water or steam can provide background heating and domestic hot water supply, a system depending upon these agencies must be supplemented by another system or systems capable of producing a high-temperature radiant source of heat, and of providing heat for cooking and for bringing small quantities of water rapidly to the boil. It is therefore of the greatest importance, in considering district heating schemes, to view them in conjunction with the supplementing service or services, as the cost of these is materially affected by the extent and nature of the duties required of them. As an example of this effect it may be pointed out that the electricity industry looks to the waterheating load to improve its load factor and thereby reduce the average cost of current, but this possibility is removed completely if hot water is supplied by a district heating scheme.

(*To be continued*)

* *Trans. Inst. Gas Eng.*, 1936-7, **86**, 1002.
† Evans, E. V., *J. Soc. Arts*, 1938, **86**, 530.
‡ "Report on the Planning of the Gas Industry," 1943 (British Gas Federation).



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Products Prices—Stocks and Shares

The London Market Dec. 10.

Pitch for briquetting has been increased by 10s. per ton, making the price 70s. per ton f.o.r. at Suppliers' Works.

As from March 5, by the Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), the prices for Road Tar, as fixed by the Coal Tar Products Prices Order, 1943, S. R. & O. No. 1528, have been increased by one halfpenny per gallon. There is also an increase of 5s. per ton in the price of standard Creosote/Pitch Mixture.

Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O., 1944 No. 1051), allows increases in the maximum prices for all forms of Naphthalene.

The Provinces Dec. 10.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's. 2s. 4d. to 2s. 6¾d., pure, 3s. 2¼d. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943, Naphthalene controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

Attention is called to Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), referred to on p. 305, "JOURNAL" of March 7.

Scotland Dec. 8.

A steady throughput is maintained. Refined tar*: Yield to distillers is 5d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5¼d. to 6¼d.; hydrogenation oil,* 5⅞d.; low gravity or virgin oil,† 7¼d. to 7½d.; benzole absorbing oil,* 6¼d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 7d. to 8d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade 2s. 10d., and 90/190 Heavy naphtha, Unrectified, 2s. 0½d.; Rectified, 2s. 4d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Markets continued dull at the opening last week on the uncertainties about the industrial and political situation, but a much more cheerful atmosphere prevailed later on the knowledge that agreement had been reached at Washington. The Funds were particularly active, and a number of specialities in the industrial section made good improvements.

The result of the publication of the Heyworth Committee Report can be seen below in the number of reactions which took place in the Gas Market. The general marking down of prices and in many instances the widening of margins was a precautionary measure, but until more details are available as to the Government's intentions with regard to the Industry doubtless prices will remain depressed.

The following is the list of price changes:

SUPPLEMENTARY LIST

Cheltenham 5 p.c. Ord.	105—110	—2
East Surrey 6 p.c. Pref.	120—125	—3
Newport (Mon.) 5 p.c. Deb.	115—120	—5
North Middlesex 5 p.c. Pref.	107—112	—3
Plymouth 5 p.c. Deb.	115—120	—5
Slough 5 p.c. Deb. (*x.d.*)	115—120	Dec. 3
Southampton 5 p.c. Red. Deb. (*x.d.*)	104—109	"
Uxbridge 5 p.c. Deb. (*x.d.*)	115—120	"

PROVINCIAL EXCHANGES

Liverpool 5 p.c. Red. Deb. (*x.d.*)	104—109	Nov. 29
Weston-super-Mare Ord.	113—115	+¼

OFFICIAL LIST

Associated Gas & Water Ord.	20/—22/—	—1/3d.
Ditto Deferred	20/—22/—	—1/6d.
British 5½ p.c. "B" Cum. Pref.	113—118	—2
Commercial 5 p.c. Deb.	113—118	—1
Croydon Sliding Scale	120—125	—2
Ditto max. div.	103—108	—1
Ditto 5 p.c Deb.	117—122	—5
East Surrey 5 p.c. Deb.	115—120	—7
Gas Light Units	20/6—21/6	—/9d.
Ditto 3 p.c. Deb. (*x.d.*)	90—93	Dec. 3
Ditto 5 p.c. Red. Deb. (*x.d.*)	106—109	"
Ditto 4¼ p.c. Red. Deb. (*x.d.*)	105—109	"
Imperial Continental Ord.	107—112	—4
Liverpool Ord.	115—120	—5
Mid-Southern "C" Cons.	106—111	—2
Primitiva Holdings Ord.	12/—13/—	—/6d.
Severn Valley Gas Corporation Ord.	21/—23/—	—1/3d.
Ditto 4½ p.c. Cum. Pref.	21/—23/—	—/6d.
South-Eastern Gas Corporation Ord.	19/9—20/9	—/3d.
South Metropolitan Ord.	88—92	—1½
South Suburban Ord.	110—115	—3
Ditto 5 p.c. Pref.	110—115	—1
Ditto 5 p.c. Deb.	115—120	—7
Tottenham Ord.	110—115	—2
Ditto 5 p.c. Pref.	110—115	—1
United Kingdom Gas Corporation Ord.	20/—22/—	—
Ditto 4½ p.c. 1st Cum. Pref.	20/— 22/—	—1/-
Ditto 4½ p.c. 2nd Pref.	19/6—21/6	—/3d.
Uxbridge Ord.	123—128	—1
Wandsworth Cons.	110—115	—2
Ditto 4 p.c. Pref.	100—103	—1
Ditto 5 p.c. Deb.	120—125	—2
Watford Ord.	113—118	—1

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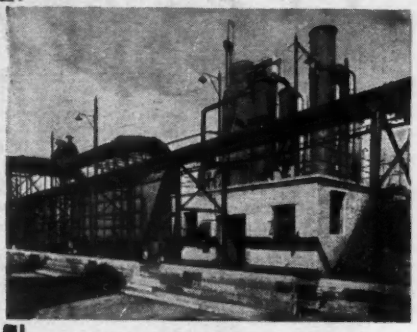

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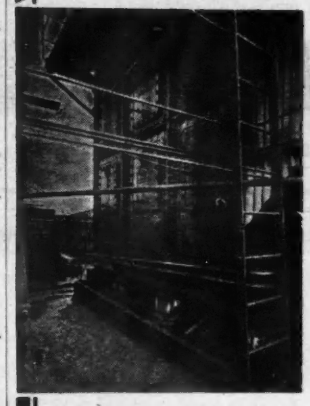

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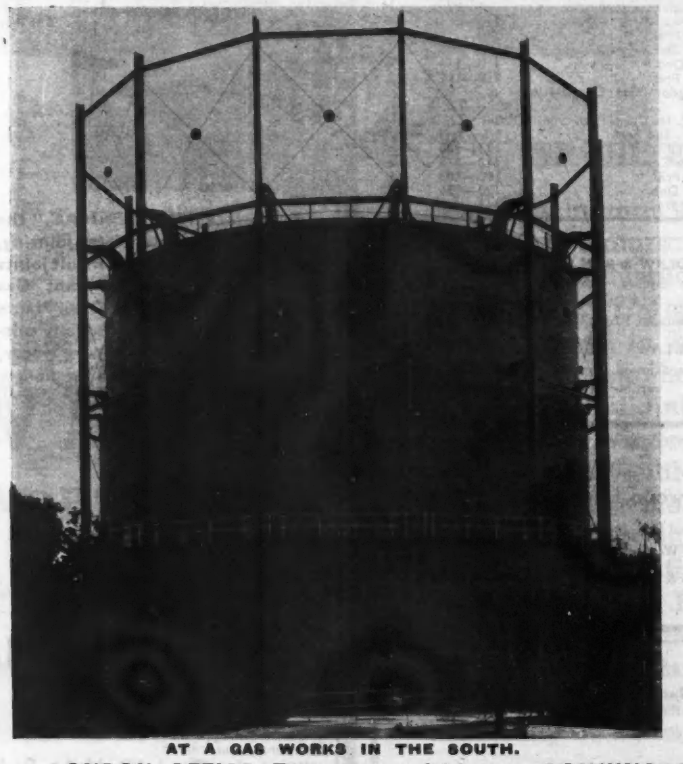

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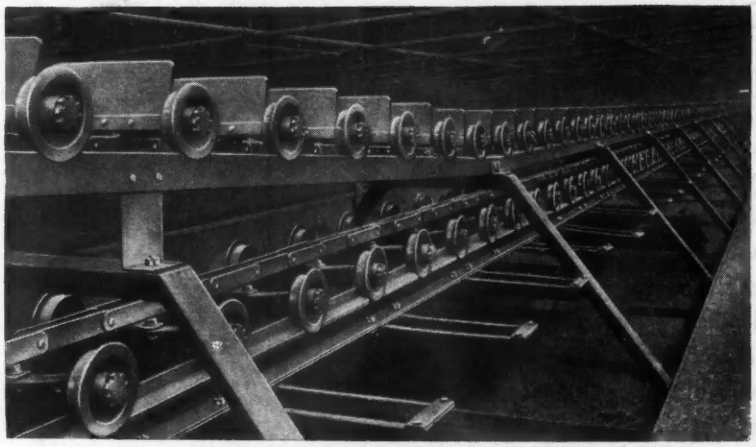

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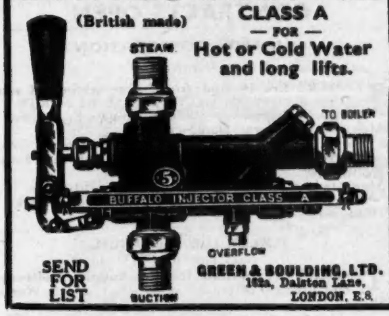

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FIRE-CLAY & BRICKWORKS
STOURBRIDGE
GAS RETORTS in BEST STOURBRIDGE QUALITY also SILICIOUS QUALITY 81% SILICA
HIGH GRADE INSULATING QUALITY FIREBRICKS
REGENERATIVE TUBES & TILES

REPAIR WORK

STREET LIGHTING
COMPLETE Overhaul of Automatic Gas Controllers. State make and type. Quotations free on application to Geo. F. Hutchinson, M.B.H.I., 36, Lee Lane, Horsforth, near Leeds.

"KLEENOFF"
—THE COOKER CLEANER
Tins for Sale to Consumers. In Bulk for Works Use.
OXIDE OF IRON.
BALE & CHURCH LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Telephone: Mansion House 1156. *Telegrams:* "Balefire, London."

THE "FLUXITE QUINS" AT WORK
"Got to FLUXITE this pipe by to-night,
And the leak's just nowhere in sight"—
"You'll cop it," cried EE,
"That's no waterpipe, see!
It's the telephone cable, you kite."

For all SOLDERING work—you need FLUXITE—the paste flux—with which even dirty metals are soldered and "tinned." It does not "poison" the solder nor corrode the metal—and can be used with safety even on sensitive apparatus.
With Fluxite, joints can be "wiped" successfully that are *impossible by any other method.*
FLUXITE has been used for over 30 years in Government Works and by the leading Engineers and Manufacturers. OF ALL IRONMONGERS — in tins — 8d., 1s. 4d., and 2s. 8d. Ask to see the FLUXITE POCKET BLOW LAMP, price 2s. 6d.
The FLUXITE GUN puts FLUXITE where you want it by a simple pressure. Price 1s. 6d. or filled 2s. 6d.

ALL MECHANICS *WILL* HAVE
FLUXITE
IT SIMPLIFIES *ALL* SOLDERING
Write for Leaflets on CASE HARDENING STEEL and TEMPERING TOOLS with FLUXITE also on "WIPED JOINTS." Price 1d. each.
Fluxite Ltd. (Dept. G.J.), Bermondsey Street, S.E.1

BOOKS

ENGINDEX. New Directory, Bibliography and Information Service for Engineers. Fully Comprehensive, always Up-to-Date, and essentially personal. Send stamp for particulars. BCM/ENGINDEX, London, W.C. 1.

PLANT &c. FOR SALE & WANTED

'PHONE 98 STAINES.

FOR SALE.—24 ft. by 9 ft. and 17 ft. by 6 ft. Cylindrical Tanks; Thompson Lancashire Boiler 24 ft. by 7 ft., 120 lb.; 34 kw. Browett 220 volt Steam Generating Set; Weir Feed Pump 8½ in. by 6 in. by 18 in.; Tangye 3-Throw Hydraulic Pump 3½ in. by 6 in.; Receiver 30 ft. by 7 ft. dia., dish ends ½ in. plate.

HARRY H. GARDAM & CO., LTD., STAINES.

FOR DISPOSAL.—A quantity of surplus gas-works plant now lying at Whetstone Gas-Works (80 million per annum) and Coalville Gas-Works (70 million per annum), including retort house equipment, coal handling plant, Morris manual retort charger, "Simplex" blue water gas plant, condensers, exhausters, washers, scrubbers, pre-heater, purifiers, vaporizer, station meter, booster, scrap gasholder, storage tanks, coke cutting and grading plant, etc. List on application to James Mitchell, Engineer and Manager, City of Leicester Gas Department, Gas Offices, Leicester.

THE following items of second-hand plant are for disposal:

1 Steam Driven Exhauster Set by Waller, capacity 60,000 cu.ft. per hour.
1 22-in. 2-Stage Gas Boosting Fan, by Bryan Donkin, capacity 60,000 cu.ft. per hour at 10-in. P.D., together with 44½ B.H.P. Vertical Gas Engine.
1 Turbine Driven Air Blower for Simplex Water-Gas Plant. Suitable for plant with gas output of 40,000 cu.ft. per day.

Prices and particulars may be obtained from the undersigned, and the items are available for inspection, by appointment, at the Gas-Works, Purley Way, Croydon.

Gas Offices, Katharine Street, Croydon. W. GROGONO, Engineer and General Manager.

APPOINTMENTS WANTED

APPOINTMENT required as ENGINEER AND GENERAL MANAGER with Gas Undertaking of repute. Fully qualified Engineer, A.M.I.Mech.E. 20 years' managerial experience.

Those interested kindly communicate with No. 9494, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

APPOINTMENTS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

VACANCY for MAIN AND SERVICE LAYER or man willing to learn. District Union rate of wages and good prospects for suitable applicant. Apply to The Manager, Okehampton Gas Company, Ltd., Station Road, Okehampton, Devon.

PEMBROKE DISTRICT GAS COMPANY

APPLICATIONS are invited for the Position of DISTRIBUTION SUPERINTENDENT to the above Company, at a commencing salary of £4 10s. per week and War bonus, at present 23s. per week.

Applicant must be fully conversant with, and have a sound practical knowledge of all modern appliances, main and service laying, public lighting, and must be capable of preparing estimates and supervising men.

Possession of City and Guilds Certificate in Gas Fitting and Supply will be an advantage.

Applications endorsed District Superintendent, stating Age, Qualifications, Training and Experience, accompanied by two recent Testimonials, must be received by the undersigned not later than December 24, 1945.

Gas Offices, Pembroke Dock. DARRELL W. REES, M.B.E., Engineer and Manager.

It is regretted that the above advertisement does not state that free house, coal and gas are part of the appointment.

BURGH OF PAISLEY

APPOINTMENT OF GAS ENGINEER AND MANAGER

THE TOWN COUNCIL OF PAISLEY invite Applications for the post of GAS ENGINEER AND MANAGER at a commencing Salary of £800, rising by annual increments of £50 to £1,100 per annum, plus J.I.C. bonus with placing at the discretion of the Town Council.

The post is designated under the Local Government and Other Officers' Superannuation Acts, 1922 to 1937, and the successful applicant will be required to pass a medical examination and contribute to the Corporation's Superannuation Fund.

Applicants must be corporate members of the Institution of Gas Engineers, and must have experience of the administration and control of all departments of a Gas Undertaking. Possession of the Gas Engineering (Manufacture) Diploma of the Institution of Gas Engineers will be considered an advantage.

Applications, stating Age, Training Qualifications, and Experience, together with *copies* of three recent Testimonials, should be addressed to the undersigned for receipt not later than 12 noon on December 22, 1945, in an envelope endorsed "Gas Engineer and Manager."

Municipal Buildings, Paisley. JOHN P. MORRISON, Town Clerk.

November 29, 1945.

BOROUGH OF OLDBURY

(GAS DEPARTMENT)

SHIFT SUPERINTENDENT

SHIFT SUPERINTENDENT REQUIRED. Appli-cants should have a practical knowledge of gas-works plant and routine, and be experienced in the working of continuous vertical retorts (preferably Glover-West) and Carburetted Water Gas Plant.

Salary £300 per annum plus war bonus (at present £59 16s. per annum).

Applications stating Age, Experience and position under Essential Works Order should be received by the undersigned not later than Saturday, December 22, 1945.

Municipal Buildings, Oldbury. ARTHUR CULWICK, Town Clerk.

Nov. 29, 1945.

THE SWANSEA GAS LIGHT COMPANY invite applications for the following two Positions:

(i) DISTRIBUTION SUPERINTENDENT: Salary £360-405 per annum, plus variable War Bonus, which at present is £59 16s. per annum.
(ii) SHOWROOMS AND BRANCH OFFICE MANAGERESS: Applicants must be qualified to give "Home Service" advice, &c. Salary £260 4s. 2d. per annum, plus variable War Bonus, which at present is £48 2s. per annum.

Successful applicants will be required to pass a medical examination, and to join the Company's Superannuation Scheme.

Applications, supported by *copies* of two Testimonials, to be addressed to the undersigned, by whom they will be received up to December 22, 1945.

The Swansea Gas Light Company, Oystermouth Road, Swansea. ERNEST ABLETT, Engineer, Manager and Secretary.

Dec. 6, 1945.

BRADFORD CORPORATION

(GAS DEPARTMENT)

APPLICATIONS are invited for the Appointment of COMMERCIAL ASSISTANT, at a commencing salary of £585, rising to £635 per annum, in accordance with Grade 3 of the Salaries and Grading Scheme, plus present cost of living bonus, which is £59 16s. per annum. Applicants should have Secretarial, Accountancy and Costing experience. Gas Industry experience will be an advantage, though not essential.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications should be submitted on Approved Form (obtainable from the Gas Engineer and Manager, Gas Department, Britannia House, Bradford), together with *copies* of three recent Testimonials and details of previous and present appointments, to the undersigned not later than January 5, 1946, in envelope endorsed "Commercial Assistant."

Town Hall, Bradford. N. L. FLEMING, Town Clerk.

December, 1945.

DRAUGHTSMEN wanted with experience in Structural and Mechanical work as applied to Gas-works Coal and Coke Handling Plant. Apply stating Age, Experience, &c., to W. J. Jenkins & Co., Ltd., Retford, Notts.

This advertisement is inserted with the permission of the Ministry of Labour and National Service.

HALESOWEN GAS COMPANY

ASSISTANT ENGINEER AND MANAGER

APPLICATIONS are invited for the above Posi-tion. Experience with horizontal retorts, C.W.G. plant and general works training is desired. The Salary will be £350 per annum, plus £60 war bonus. Living accommodation available if required. Applicants should state their Age, giving details of Training, Qualifications and Experience, with *copies* of three Testimonials, not later than December 17, 1945.

Gas Offices, Halesowen, Worcestershire. J. H. WAINWRIGHT, Engineer, Manager and Secretary.

CITY AND ROYAL BURGH OF DUNFERMLINE

(GAS DEPARTMENT)

APPLICATIONS are invited for the position of ASSISTANT ENGINEER AND MANAGER of the Corporation Gas Undertaking, at a commencing Salary of £425 per annum, rising by annual increments of £25 to a maximum of £500 plus War Bonus, at present £60 per annum. The post is superannuable, and the selected candidate will be required to pass a medical examination before appointment.

Applicants must possess either the Diploma or the Higher Grade Certificate in Gas Engineering (Manufacture).

Six copies of application, endorsed "Assistant," and accompanied by *copies* of not more than three recent Testimonials, to be delivered to the undersigned not later than Monday, December 24, 1945. Canvassing is prohibited.

Corporation Gas-Works, Dunfermline. E. G. SMITH, Engineer and Manager.

December 5, 1945.

(This advertisement is issued with the permission of the Ministry of Labour and National Service.)

ALLIANCE AND DUBLIN CONSUMERS, GAS COMPANY

APPOINTMENT OF ASSISTANT TO THE CHIEF ENGINEER

APPLICATIONS are invited for the Position of Assistant to the Chief Engineer, at a commencing salary of £800 per annum, rising by annual increments of £50 to a maximum of £1,000 per annum, subject to satisfactory service. Applicants must have sound experience of gas manufacture in vertical and horizontal retorts, automatic carburetted water gas sets, tar distillation, benzole extraction and sulphate of ammonia manufacture. They must have an engineering qualification, and have experience in the control of men. Applications, stating Age and Experience, together with the names of not more than three persons from whom references can be obtained, must be delivered to the Secretary of the Company not later than December 31, 1945. Canvassing, directly or indirectly, will entail disqualification.

24A, D'Olier Street, Dublin.

CONTRACTS OPEN

DUMFRIES CORPORATION

(GAS DEPARTMENT)

TENDERS are invited for the re-setting of one Through bed of 8 HORIZONTAL RETORTS.

Full particulars may be obtained from the Engineer and Manager, Gas-Works, Dumfries.

Tenders, in plain sealed envelopes, endorsed "Re-setting Retorts," to be addressed to the undersigned and received not later than January 21, 1946.

Municipal Chambers, Dumfries. J. HUTCHEON, Town Clerk.

December 5, 1945.

ILKLEY U.D. COUNCIL

(GAS DEPARTMENT)

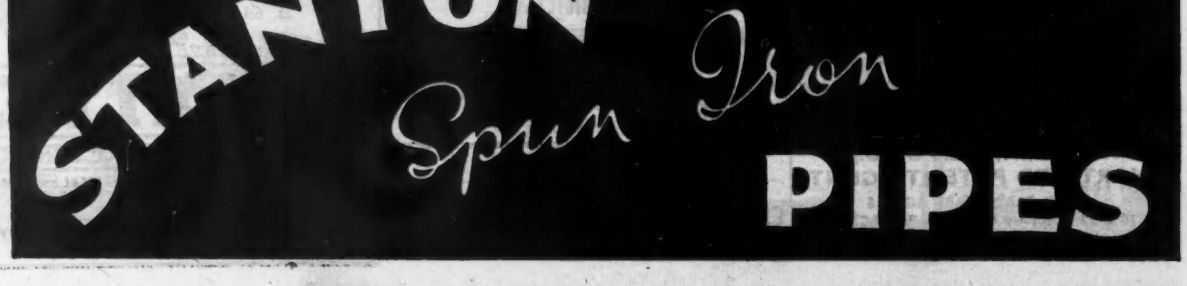
TENDERS are invited for the Supply, Delivery, and Erection of the following plant, at Gas-Works, Ilkley.

(*a*) One 35,000 cu.ft. per hour Steam Driven EXHAUSTER.
(*b*) One 1 million cu.ft. per day ELECTROSTATIC DETARRER.

Particulars may be obtained from the Gas Engineer and Manager, Leeds Road, Ilkley.

Tenders endorsed "Gas Plant" and enclosed in plain sealed envelope must be delivered to me not later than Monday, December 31, 1945. The Council do not bind themselves to accept the lowest or any Tender.

JOSEPH A. JONES, Clerk of the Council.



MODERN
VERTICAL
TUBE
CONDENSERS
by
FOUNDED 1850
HOLMES
HUDDERSFIELD
Efficient modern condensers designed to take full advantage of high gas and water velocities can be supplied with vertical or horizontal tubes. Many installations of each type are in operation.
Vertical tube condenser, capacity 5 million c. ft. per day, in operation at a Northern works.
HEAD OFFICE • TURNBRIDGE • HUDDERSFIELD
LONDON OFFICE · 119 VICTORIA ST. S.W.1 · MIDLANDS OFFICE 21 BENNETTS HILL BIRMINGHAM 2
Telephones: Huddersfield, 5280 LONDON, Victoria, 9971 : BIRMINGHAM, Midland, 6830

C242

Protection—

The Hermit Crab is literally "a poor fish," and for all we know, he may be responsible for the coining of that well-known phrase. Apparently he has neither brains nor—to put it vulgarly—guts! Else how could he be content with somebody's discarded abode as his lodging? Nevertheless, this "discarded" abode becomes his only protection (and a very efficient one) against the rigours of the elements and against his natural enemies. And this brings us to the point of this short narration . . . you must have protection and that protection must be efficient. Obviously, then—

HERMIT CRAB. A variety of crab that lives in mollusc's cast-off shell to protect its shell-less hinder parts.

your protection is the

'A & M' METER

ALDER & MACKAY LTD., NEW GRANGE WORKS, EDINBURGH, 11

GUNITE

for

PERMANENT REPAIRS TO BUNKERS AND ALL CONCRETE OR STEEL STRUCTURES

BORED PILING

for

SOLID FOUNDATIONS TO NEW STRUCTURES OR UNDER-PINNING TO EXISTING BUILDINGS

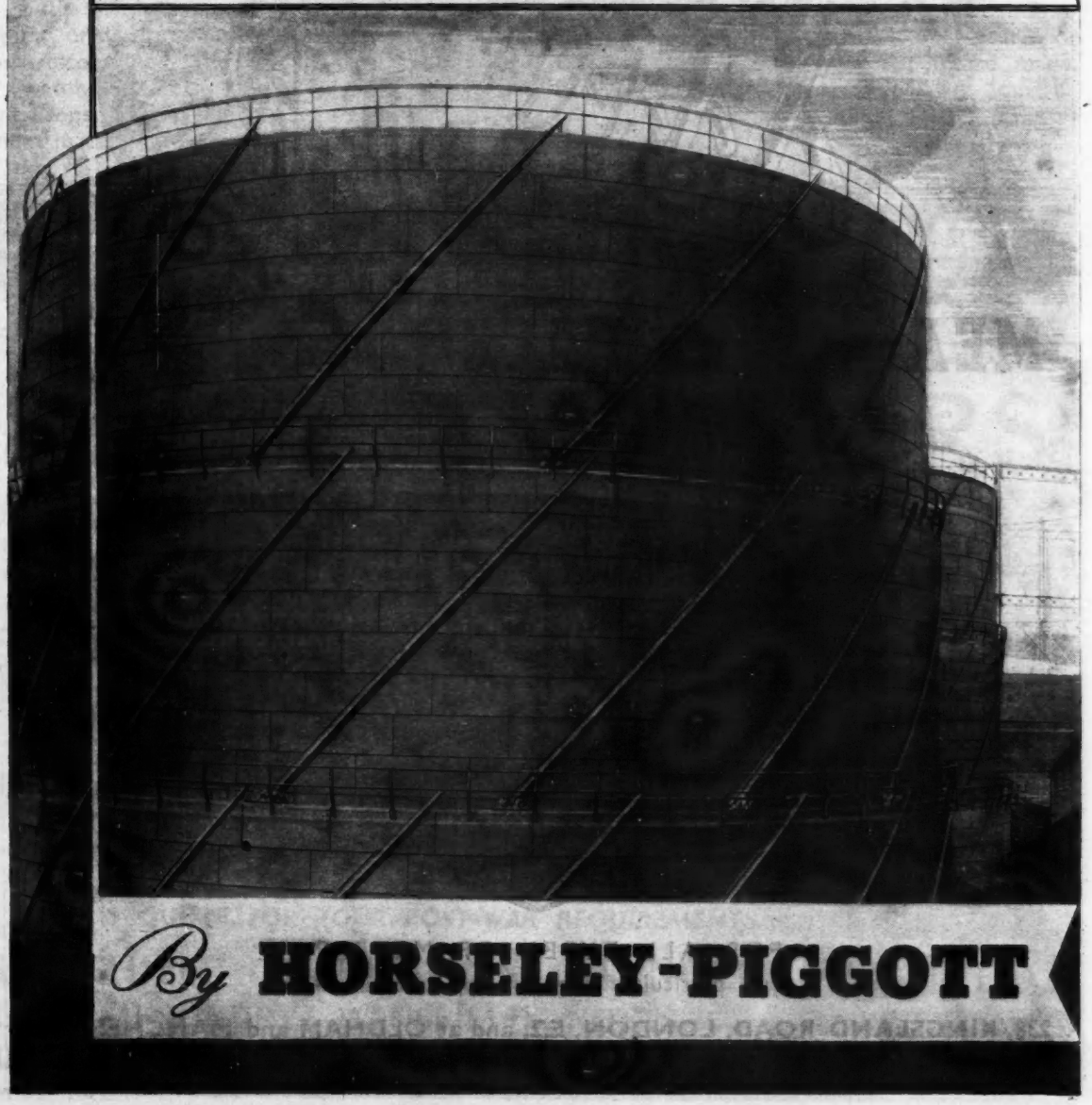
THE CEMENTATION COMPANY LTD.

39, VICTORIA STREET, S.W.1. BENTLEY WORKS, DONCASTER

GAS HOLDERS

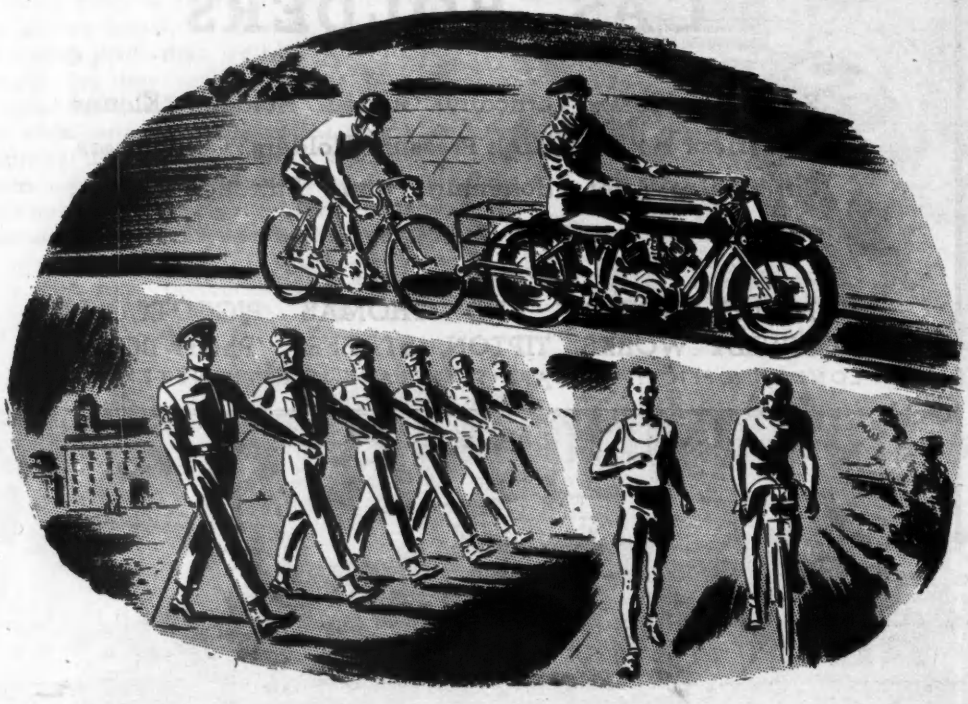
Spiral Holders, Vertically Guided Holders, Klonne Waterless Holders, High Pressure Holders, Condensers, Purifiers, Water Softening and Filtration Plant:

HORSELEY BRIDGE AND THOMAS PIGGOTT, LTD.,
HORSELEY WORKS, TIPTON, STAFFS. 'Phone 1104 P.B.X.
LONDON OFFICE: 22, CARLISLE PLACE, WESTMINSTER, S.W.1.



By HORSELEY-PIGGOTT

MASTERLY MEASUREMENT No. 4.



MEASURED PACE

"Setting the pace" means ultimately getting the best possible out of an individual or an instrument and an accurate "pacer" can claim much to his credit.

War has certainly "set the pace" for Industry, and the hard-worked Gas Meter has certainly not lagged in production's forced marches on toward victory.

To the layman there is nothing outwardly spectacular in the Gas Meter's achievements, but to Industry it is all-important.

Meters made by the Gas Meter Company Ltd. are to-day all over the country, setting and maintaining a pace too hot for the enemy.

THE GAS METER COMPANY LTD.

FOR ALL TYPES OF METERS.
Full particulars sent on application to—

238, KINGSLAND ROAD, LONDON, E.2, and at OLDHAM and MANCHESTER

GM/PM.4.

Arkon

INSTRUMENTS

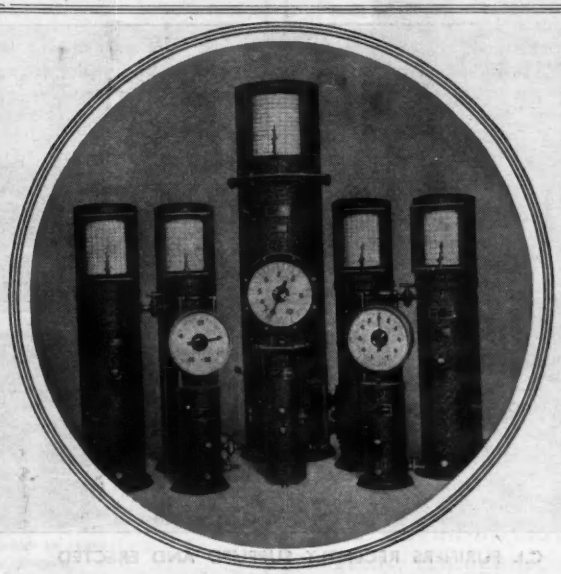
OF PARTICULAR INTEREST TO GAS WORKS

GAS FLOW RECORDERS

will measure any quantity of gas or air at steady or pulsating flow. Can be used for mains of any diameter from 2 in. to 6 ft.

PRESSURE & VACUUM RECORDERS

are built for pressure, vacuum or vacuum and pressure combined. They are water-filled instruments, sensitive and permanent in calibration.



GAS FLOW INDICATORS

have the advantage of a large dial (8 in. diam.), giving a very open scale. Available in both wall mounting and portable types.

PRESSURE & VACUUM INDICATORS

are useful where indication of low pressures or vacua are to be made. Portable types can be supplied.

WALKER, CROSWELLER & CO., LTD.
CHELTENHAM GLOS.

61.1789

STATIC WASHERS

for

AMMONIA AND BENZOL EXTRACTION

NH_3 ——— ooo ——— C_6H_6

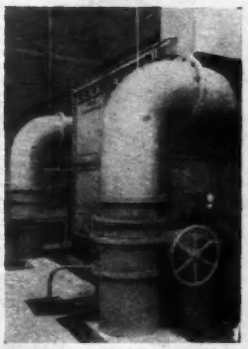
MAXIMUM:

(*a*) Wetted Surface possible by using Corrugated Sheet Steel Bundles.

(*b*) Tar Fog Extraction by High-Speed Sprays.

(*c*) Strength Liquor with Minimum Water or Weak Liquor Supply.

Specially designed Centrifugal Pumps, having Low Power Consumption.



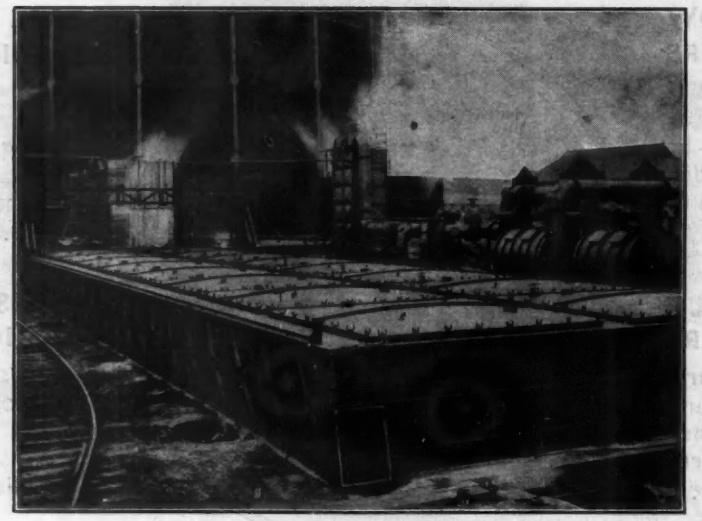
LET US QUOTE FOR YOUR POST-WAR REQUIREMENTS

KIRKHAM, HULETT & CHANDLER, LIMITED
UNION FOUNDRY, MANSFIELD, NOTTS.
Phone: 1256, 1257 (two lines).
Grams: Castings, Mansfield.
London Office: NORFOLK HOUSE, NORFOLK ST., STRAND, W.C.2.
Phone: TEMple Bar 2943.
Grams: Washer, Estrand, London.

E. C. & J. KEAY, LIMITED

CONSTRUCTIONAL ENGINEERS AND IRONFOUNDERS,

Head Office :
6, Corporation St.,
BIRMINGHAM

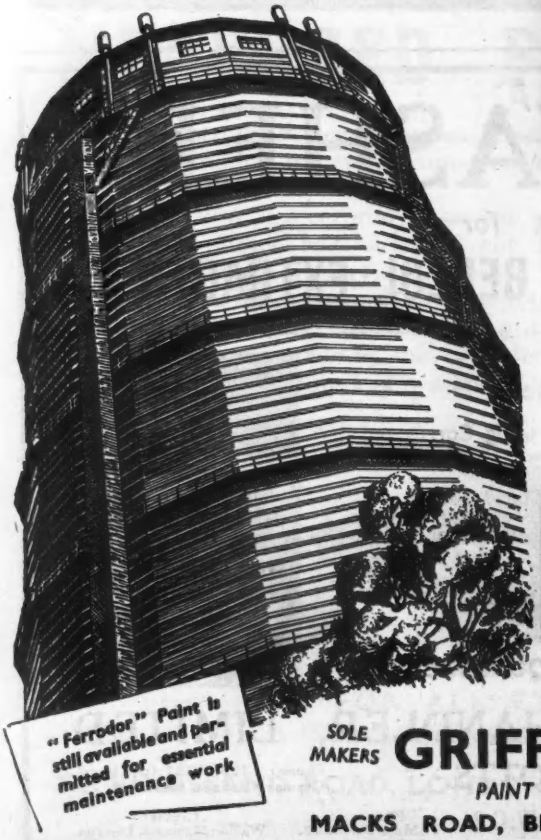


C.I. PURIFIERS RECENTLY SUPPLIED AND ERECTED

London Office :
25, VICTORIA STREET,
S.W.1

Southampton
21, PORTLAND STREET

Specialists in TANKS, Steel or Cast-Iron, Riveted or Welded



"Ferrodor" Paint is still available and permitted for essential maintenance work

Give GASHOLDERS and other steel structural work the best possible

PROTECTION

Owing to its exceptional rust-inhibiting properties, "Ferrodor" Metal Protection affords great economy in labour and reduces maintenance costs to the minimum

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METAL PROTECTION

SOLE MAKERS **GRIFFITHS BROS & Co LONDON Ltd**

PAINT ENAMEL AND INSULATING VARNISH SPECIALISTS

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HUMIDINE
NON-SETTING PAINT

Used by the leading Gas Companies for the protection of the lower plates and cuppings of gas-holders. The most efficient anti-corrosion paint in existence

HUMIDINE NEVER DRIES, NEVER CRACKS AND IS ABSOLUTELY IMPERVIOUS TO WATER

OXY-GRAFITE PAINT

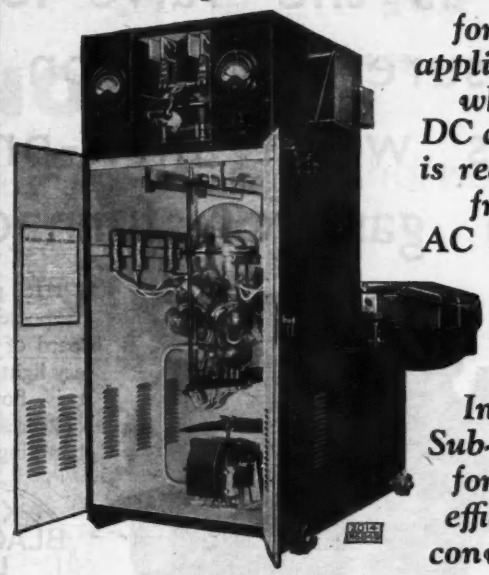
For the Protection against the corrosive effects of acid and alkaline fumes on all iron and steel-work of gasworks, Aspinalls Oxy-Grafite Paint is unsurpassable

Full particulars and prices on request from the sole proprietors

ASPINALLS (PAINTS) LIMITED
CARLETON — SKIPTON — YORKS

Mercury-Arc Rectifiers

for all applications where DC current is required from AC supply



Indoor Sub-station for high efficiency conversion

Completely self-contained, with AC and DC circuit-breakers, meters and control gear. Automatic voltage control to maintain voltage at pre-set figure for all loads

The **ELECTRIC CONSTRUCTION Co.** Ltd.
WOLVERHAMPTON

CALORIFIERS

HOLDEN & BROOKE LTD
SIRIUS WORKS MANCHESTER 12

WALTER SLINGSBY & CO. LTD.

ARE THE MAKERS OF

WASK TRADE MARK

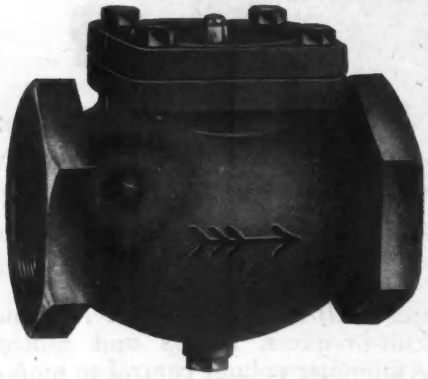
MALLEABLE IRON PIPE FITTINGS FOR OVER FIFTY YEARS

OVER 5,000 TYPES & SIZES FOR GAS, WATER, STEAM, OIL AND BENZOL

AIR TEST AND TAPER THREADS GUARANTEE THEIR UNFAILING SERVICE

Please write us at:—
NEW DAM WORKS, KEIGHLEY.
'Grams: Malleable, Keighley. 'Phone: Keighley 3749 (2 lines)

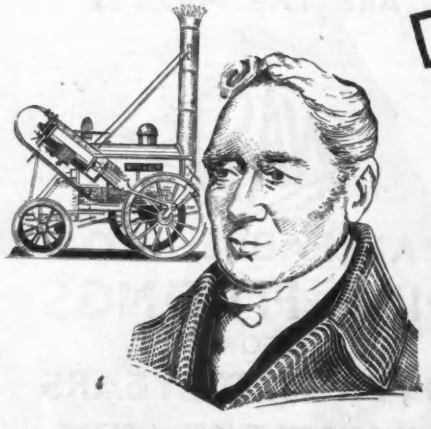
This is the valve for preventing back-pressure of air on meter and service pipes when high-pressure air is used with gas for furnace work, etc. . .



THIS patent Back-pressure Valve has advantages not possessed by others and meets all the requirements of Board of Trade Regulations. The internal valve proper is very light and offers very little resistance to the gas pressure. It is, however, sufficiently stiff to withstand considerable back-pressure, and a dash-pot is provided to prevent chattering. Drain plug is fitted for withdrawing any condensation, and provision is made for lifting the valve from its seat should it become stuck owing to naphthalene or other deposits. Nine sizes, ¾" to 6" inlet and outlet. Prices on application.

KEITH BLACKMAN LTD.
MILL MEAD ROAD, LONDON, N.17.
'PHONE: TOTTENHAM 4522.
GRAMS: KEITHBLAC, PHONE, LONDON

"Keith Blackman" Back-pressure Valve



GEORGE STEPHENSON 1781–1848

After working on Watt's invention Stephenson first produced an engine which would draw coal trucks at four miles per hour. In 1821 he was appointed engineer on the Stockton and Darlington Railway, the first passenger train there pulling 38 carriages at a rate of 12 miles per hour.

FAMOUS PIONEERS No. 3

In Edinburgh, over eighty years ago, David Grant & Co., Ltd., opened a line of thought which helped to carry the Gas Industry forward at a speed which revolutionised our countryside and, as early as 1895, had introduced Pre-payment Meters with Optional Coin facilities. To-day, like the ubiquitous railway, you find David Grant equipment everywhere — Pre-payment or Ordinary Meters, Pressure Gauges and Syphon Pumps—doing the job efficiently.

Enquiries invited for Standard Brass Fittings and Brass Work to particular specifications.

Members of the Society EST 1855 *of British Gas Industries*

David Grant & Co., Ltd.

Pioneers in Pre-payment Meters

EAST CROSSCAUSEWAY, EDINBURGH, 8. AND AT MANCHESTER.

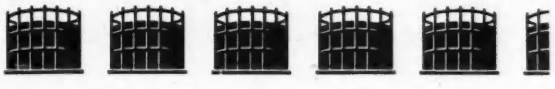
TELEPHONE : EDINBURGH 41574

Printed by Straker Brothers, Ltd., London, E.C.2, for Walter King, Limited, 11, Bolt Court, Fleet Street, London, E.C.4.—Wednesday, December 12, 1945.

DO YOU KNOW

how much gas was produced by authorised undertakings in the years between the 1st and 2nd world wars?

EACH **=** 10,000,000,000 cu. ft. above the first 250,000,000,000 cu. ft.

1922	
1927	
1932	
1937	

The above chart compiled from Board of Trade returns, coal-gas and water-gas, includes also coke oven gas purchased and small amounts of special types (Mond Gas, Producer Gas, etc.).

The need for accurate measurement grows with the years.

W.&B.COWAN

INCORPORATED IN PARKINSON & COWAN (GAS METERS) LTD.

FITZALAN STREET WORKS, KENNINGTON ROAD, LONDON

Branches at

MANCHESTER · NEWCASTLE-ON-TYNE · GLASGOW

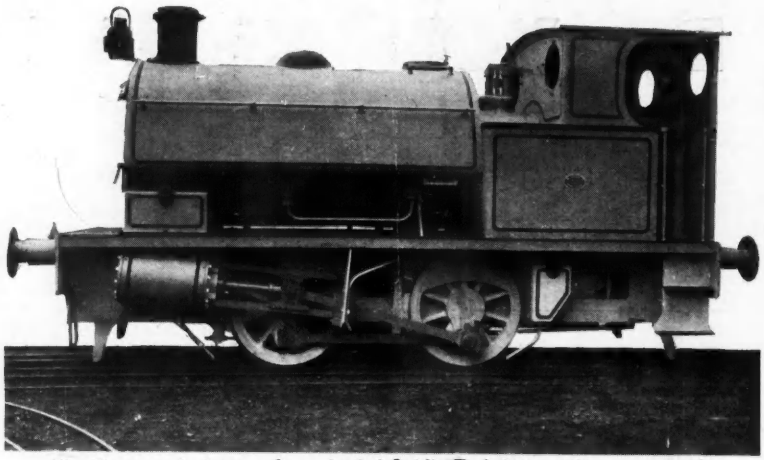
Manufacturers of all types of quality appliances for the measurement and pressure control of Coal Gas

C.M.C.9

GAS WORKS SHUNTING LOCOMOTIVES

BUILDERS OF ALL TYPES OF STEAM LOCOMOTIVES, ALSO WAGONS, TURN-TABLES AND OTHER RAILWAY EQUIPMENT.

LOCOMOTIVES DESIGNED TO SUIT CLIENTS RE-QUIREMENTS



The Photograph shows a four-wheeled Saddle Tank Locomotive, as recently supplied to several Gas Works.
Weight in Working Order 27 Tons. Cylinders 14" × 22"
Tractive Effort at 85% of Boiler Pressure — 13,800 lb.

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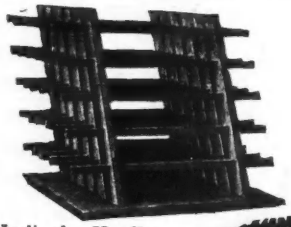
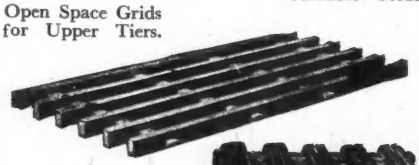
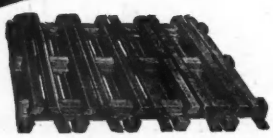


Inclined Hurdles (Light or Heavy Type) with Bottom Flat Grids.

Scrubber Grids.

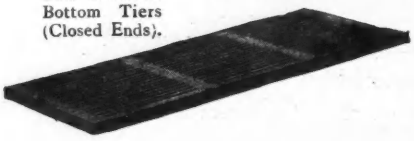
Open Space Grids for Upper Tiers.





Patent Double-Barred Grids.

Flat Grids for Bottom Tiers (Closed Ends).



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